GENERAL CHEMISTRY

UNIT 1: ATOMIC STRUCTURE AND PERIODIC TABLE

Select the lettered item which best completes or answers the following:

1. Cathode rays were discovered by
   (a) J.J. Thomson (b) R.A. Milikan (c) Johnstone stoney (d) Rutherford

2. Which of the following statements about cathode rays is wrong ?
   (a) The rays produced a mechanical effect
   (b) The charge/mass ratio is independent of the nature of the gas
   (c) The charge/mass ratio for these rays is considerably smaller than for positive rays
   (d) The rays carry a negative charge

3. The charge of the electron was determined experimentally by
   (a) J.J. Thomson
   (b) R.A. Milliken
   (c) E. Goldstein
   (d) James Chadwick

4. The charge and mass of electrons are
   (a) -1.602×10^{-19} and 9.109×10^{-31} kg
   (b) $+1.602 \times 10^{-19}$ C and 1.6726×10^{-27} kg
   (c) 1.602×10^{-19} C and $1.6749 \times 10–27$ kg
   (d) 4.80×10^{-10} and 9.10×10^{-23} kg

5. Which statement about positive rays is false?
   (a) Positive rays are produced simultaneously with cathode rays
   (b) The charge to mass ratio for these positive rays is not constant but that it varies with the residual gas in the tube
   (c) The largest value of e/m for positive rays is obtained when hydrogen is the residual gas
   (d) Various positive particles have same e/m value.

6. Which ion would be deflected most by the field in a mass spectrometer?
   (a) $^{4}_{2}He^{2+}$ (b) $^{14}_{7}N^{2+}$ (c) $^{14}_{6}C^{2+}$ (d) $^{3}_{1}H^{+}$

7. Millikan's oil-drop experiment is used to find
   (a) e/m ratio of an electron
   (b) electronic charge
   (c) mass of an electron
   (d) velocity of electron

8. Rutherford's alpha ray scattering experiments with thin foils of gold showed that
   (a) the atom was primarily empty space with a small massive core of nucleus from which a few alpha-particles (1 : 10,000) were deflected
   (b) atomic radius is of the order of 10^{-2} cm
   (c) nuclear radius is of the order of 10^{-13} cm
   (d) all of these

9. If nuclear radius is 10^{-13} cm and atomic radius is 10^{-8} cm, the ratio of atomic volume to nuclear volume would be
   (a) 10^{+12} (b) 10^{+15} (c) 10^{+8} (d) 10^{+20}

10. The mass of a nucleus is 20 times the mass of proton which is 1.67×10^{-24} g, From this, it follows that the mass of nuclear matter is of the order of
(a) 1 g per ml (b) 20 g per ml (c) 10^7 per ml (d) 10^{15} g per ml

11. Mosley's name is associaated with the discovery of
(a) atomic numbers (b) mass numbers (c) atomic weights (d) protons

12. The basic conclusion that may be drawn from the experimental studies with x-rays carried out by Mosley is that
(a) the frequency of vibration is independent of atomic number
(b) the frequency of vibration is inversely proportional to the atomic number
(c) the atomic number is equal to the charge on the nucleus
(d) the number of protons and neutrons in the nucleus are nearly equal

13. Mosley found that the frequency, of a characteristic line of x-ray spectrum of an element is related to the number Z of the element as: = (a – nb) where a and b are constants. What is the atomic number of an element for which the corresponding line in the x-ray spectrum occurs at a wave length of 0.657 Å ? Given a is 5.0×10^3 and b is 1.0.
(a) 21 (b) 39 (c) 43 (d) 57

14. The most recent atomic weight scale is based on
(a) $^{16}O = 16$ (b) O = 16 (c) C = 12 (d) $^{12}C = 12$

15. Calculate the chemical atomic weight from the following data obtained from spectroscope?

Isotope	Abundance	Mass (amu)
$_8O^{16}$	0.99759	15.9995
$_8O^{17}$	0.00037	16.991
$_8O^{18}$	0.00204	17.9991

The chemical atomic weight of oxygen is computed to be
(a) 15.999 amu (b) 16.0001 amu (c) 15.888 amu (d) 16.101

16. Which of the following is group of isotones
(a) ^{35}Cl, ^{37}Cl (b) ^{40}Ar, ^{40}Ca (c) $_{14}Si^{30}$, $_{15}P^{31}$, $_{16}S^{32}$ (d) None of these

17. The separation of isotopes by mass spectrograph is based on the fact that
(a) various positive particles have different e/m values
(b) isotopes differ in number of neutrons
(c) isotopes have same nuclear charge
(d) isotopes have same atomic number

18. In alpha-ray scattering experiments, one in 10,000 was deflected back. Most of the alpha particles which were not deflected back
(a) caused the gold-foil to become radioactive
(b) were absorbed by the gold foil
(c) passed throgh the extra-nuclear part of the atom
(d) were neutralised by the negative electrons

19. The mass of an atom is
(a) spread uniformly throughout
(b) concentrated mainly in the electrons
(c) concentrated mainly in the nucleus
(d) zero, because there are as many electrons as positive charges

20. In alpha-ray scattering experiment, 8.15×10^{12} helium nuclei strike the ZnS screen per second during which time 1.35×10^{-11} moles of helium gas is evolved. The Avogadro's number can be calculated as:
    (a) $8.15 \times 10^{12} / 1.35 \times 10^{-11}$
    (b) $1.35 \times 10^{-11} / 8.15 \times 10^{12}$
    (c) $1.35 \times 10^{-11} \times 10^{12}$

21. Radiant energy includes all electromagnetic radiation:

    x-rays, gamma rays (high frequency), U.V., visible, I.R., radio-waves (low frequency). Which of the following is the correct relation between wave number/frequency (ν) and $(\bar{\nu} = 1/\lambda)$, speed (c) of light ?

    (a) $\bar{\nu} = c / \nu$ (b) $c(\nu)^{1/2} = \bar{\nu}$ (c) $\nu = c \times \bar{\nu}$ (d) $\bar{\nu} = \nu \times c$

22. Which is the correct order of the wave number of the following radiations:

    I.R., U.V., radio-waves, x-rays and visible light
    (a) x-rays > U.V. > I.R. > Visible > radio-wave
    (b) x-rays > U.V. > visible > I.R. > radio-waves
    (c) radio-waves > I.R. > Visible > U.V. > x-rays
    (d) x-rays > radio-waves > Visible > U.V. > I.R.

23. Which of the following statements is not correct regarding electro-magnetic spectrum ?
    (a) Cosmic rays have shorter wave length than radio-waves
    (b) x-rays have smaller wave number than cosmic rays
    (c) The velocity of x-rays is more than that of micro-waves
    (d) The frequency of microwaves is less than that of U.V. rays

24. Wave lengths of electrons confined to atoms are of the order
    (a) 10^{14} m (b) 10^{-1} m (c) 10^{-10} m (d) 10 m

25. Which of the following radiation of the visible part of the spectrum has lower frequency and larger wave length ?
    (a) red (b) violet (c) green (d) yellow

26. The energy associated with a photon of light wave length 400 nm is
    (a) 4.97×10^{-19} J (b) 2.495×10^{-19} J (c) 4.97×10^{-17} J (d) 2.495×10^{-17} J

27. Which one of the following requires a corpuscular interpretation of light ?
    (a) Bragg's diffraction law
    (b) Photo-electric effect
    (c) interference
    (d) reinforcement

28. Energy of a quantum of light is given by
    (a) $c^2/E/m$ (b) $\nu = E/h$ (c) $E = (h \times C^2) \times \lambda$ (d) $E = h/\lambda$

29. Relation connecting mass and energy is given by
    (a) $\lambda = h^2/mv$ (b) $E = hm$ (c) $E = m^2C(d)$ $c = (E/m)^{1/2}$

30. Which of the following wave-lengths will have higher energy per quantum ?
    (a) 6000 Å (b) 4000 Å (c) 4500 Å (d) 5000 Å

31. One Einstein is

(a) 1 mole of quanta (b) $E = nh\nu$ (c) $E = Nh\ c/\lambda$ (d) all of these

32. Which of the following energies cannot be possessed by an oscillator ?
(a) 1 hv (b) 1.5 hv (c) 2 hv (d) 3 hv

33. Which of the following concerning photoelectric effect is false?
(a) it displays the particle nature of light
(b) electrons are emitted only if light has a frequency above that of a critical frequency
(c) changing the intensity of the light changes the energies of the electrons
(d) changing the intensity of light changes the number of electrons ejected per second

34. The wave length of x-rays is of the order of
(a) 1 metre (b) 1 centimeter (c) 1 Angstrom (d) 1 micron

35. The frequency 6.4×10^{13} cycles per second lies in which of the following regions of the electromagnetic spectrum?
(a) Infra-red (b) U.V. (c) x-rays (d) radio-waves

36. The threshold frequency for photo electric emission of electrons from platinum is 1.3×10^{15} sec^{-1}. What is the minimum energy that photons of a particular radiation must possess to produce the photoelectric effect with platinum metal ?
(a) energy must be equal to $6.63 \times 10^{-34} \times 1.3 \times 10^{15}$ J
(b) energy must be greater than $6.63 \times 10^{34} \times 1.3 \times 10^{15}$ J
(c) energy corresponding to 400 nm
(d) none of these

37. Calculate the work function for Na if threshold frequency is 4.39×10^{14} sec^{-1}.
(a) $h\nu_0$
(b) $h \times c/\lambda_0$
(c) $6.63 \times 10^{-34} \times 4.39 \times 10^{14}$
(d) all of these

38. The line spectrum is
(a) given by element
(b) characteristic of an element
(c) used to identify an element
(d) all of these

39. Which of the following is not a wave property ?
(a) light beam slows down on entering glass from air
(b) light releases photoelectrons with no time delay
(c) electron beams form an interference pattern
(d) light can be polarized

40. Light displays particle properties when
(a) it passes through a lens
(b) it is dispersed by a spectroscope
(c) it reflects from a mirror
(d) it is absorbed or emitted by matter

41. Violet light is more effective than red light in releasing photo electrons because
(a) it has more total energy
(b) it has a longer wave length
(c) it is brighter
(d) it has more energy per photon

42. Planck's constant is expressed in
(a) Joules/sec (b) inverse seconds (c) Joules-seconds (d) Joules

43. When photoelectric emission is taking place, increasing the intensity of the light will
(a) have no effect
(b) increased the number of electrons released
(c) increase the maximum energy per electron
(d) cause a time delay in the emission of electrons

44. The maximum energy of emitted electrons is measured by
(a) the largest potential difference they can transverse
(b) the current they produce
(c) the potential difference they produce
(d) the speed with which they emerge

45. The electron volt is a measure of
(a) energy (b) current (c) potential difference (d) charge

46. One electron volt of energy is equivalent to a photon with a wave length of about
(a) 400 Å (b) 60 Å (c) 5000 Å (d) 12000 Å

47. Energy equivalent of rest mass of an electron is about
(a) 5 ergs (b) 10^{-1} ergs (c) 10^{-6} ergs (d) 10^{-20} ergs

48. In nuclear reaction, the unit of effective cross-section is a barn which is
(a) 10^{-24} cm^2 (b) 10^{-18} cm^2 (c) 10^{-12} cm^2 (d) 10^{-15} cn^2

49. The momentum of a photon
(a) depends on Planck's constant
(b) depends on its speed
(c) increases as the frequency decreases
(d) increases as the wave length decreases

50. Visible-light photons would not show the compton effect because they
(a) have no momentum
(b) travel too slowly
(c) have too small a mass
(d) have larger wave length

51. When X-ray photons collide with electrons
(a) they slow down
(b) their mass increases
(c) their wave length increases
(d) their energy increases

52. In order to observe the wave properties of particles, it is necessary to use particles that
(a) have large mass and velocity
(b) have large mass and small velocity
(c) have small mass and large velocity
(d) have a small mass and velocity

53. Diffraction of electron beam is evident that
(a) matter has wave properties

(b) electrons repel each other
(c) electrons are a form of light
(d) electrons have momentum

54. As the frequency of photons increases
(a) their energy and wave length increases
(b) their mass increases and their energy decreases
(c) their energy, mass and velocity increases
(d) their energy and momentum increases

55. Caesium metal emits electrons when exposed even to red light but Zn requires violet light. From this, we conclude that
(a) Cs has a lower work function
(b) electrons emitted from Zn have more energy
(c) electrons emitted from Cs have more energy
(d) Zinc has a lower work function

56. Photoelectric current is proportional to
(a) the work function of the light
(b) the frequency of the light
(c) the intensity of the light
(d) Planck's constant

57. Newton proposed that light consists of
(a) a stream of particles
(b) photons
(c) electromagnetic waves
(d) waves of an unknown nature

58. The measured value of the speed of light in a vacuum is consistent with the assumption that light consists of
(a) a stream of particles
(b) photons
(c) electromagnetic waves
(d) photo-electric effect

59. Which of the following is not a photon property ?
(a) compton collisions
(b) line spectra
(c) interference
(d) photo-electric effect

60. If an electron can be stopped by a potential of 20 volts, its K.E. is
(a) 20 eV (b) 20 volts (c) 20 calories (d) 20 joules

61. The momentum of photons can be demostrated by the fact that a light beam
(a) can be polarized
(b) has a definite frequency
(c) can cause the emission of electrons

(d) exert pressure

62. If the radiation from a radio-active material is passed through an electric field
    (a) all three kinds of rays will be deflected
    (b) only the gamma rays are deflected
    (c) the alpha and beta rays are deflected
    (d) only the alpha is deflected

63. The particles of gamma radiations are
    (a) photons (b) electrons (c) protons (d) helium nuclei

64. When alpha particles pass through a thin foil,
    (a) they all pass straight through
    (b) they are all deflected
    (c) most of them are deflected
    (d) most of them pass straight through

65. The deflection of alpha particles passing through a thin foil is caused by
    (a) electrostatic repulsion by the nucleus
    (b) collision with nucleus
    (c) interaction with electrons
    (d) attraction towards the nucleus

66. Alpha particles that come closer to the nucleus
    (a) are deflected more
    (b) are deflected less
    (c) make more collisions
    (d) are slowed down more

67. If an alpha particle is headed straight for a nucleus, it comes to rest when
    (a) its total energy is zero
    (b) it strikes the nucleus
    (c) it strikes the electronic shells
    (d) the K.E. it has lost is equal to the electrical P.E. it has gained

68. The expression Ze gives
    (a) the charge on a nucleus of atomic number Z
    (b) the charge on an electron
    (c) the charge on an alpha particles
    (d) the K.E. of an alpha particle

69. The electron of Rutherford's atomic model would be expected to lose energy because they
    (a) are atracted by the nucleus
    (b) strike each other
    (c) are accelerated
    (d) are in motion

70. A gas that accumulates around the reactive material is
    (a) H_2 (b) N_2 (c) He (d) Ar

71. The angle through which an alpha particle is deflected
    (a) increases as the atomic number increases
    (b) is independent of the atomic number and mass
    (c) increases as the atomic mass increases
    (d) increases as the atomic number decreases

72. Rutherford's model of atom is unstable because
    (a) nuclei tend to break down
    (b) orbiting electrons radiate energy
    (c) electrons are attracted to the nucleus
    (d) the electrostatic force is insufficient to held the electrons in orbit

73. A dark line spectrum is produced by
    (a) passing white light through a cold gas
    (b) exciting gases to higher energy levels
    (c) passing light through a hot gas
    (d) bombarding gases with electrons

74. Bohr's atomic model violated the moles of classical physics because it assured that
    (a) all electrons have the same charge
    (b) the nuclear charge is quantized
    (c) electrons can go into an orbit around the nucleus
    (d) a charged particle can accelerate without producing radiation

75. The planetary model of the atom is known as the
    (a) Simple model of the atom
    (b) Bohr model of the atom
    (c) Orbital model of the atom
    (d) Valency bond model of the atom

76. The radii of first 2^{nd} and 3^{rd} allowed Bohr's orbit for hydrogen are in the ratio of
    (a) 1 : 2 : 3 (b) 1 : 4 : 9
    (c) 1 : 1/2 : 1/3 (d) none of these

77. The radius of Bohr's fifth orbit for hydrogen is
    (a) $5^2 \times r_1$
    (b) 25×0.529 Å
    (c) $25 \times 0.529 \times 10^{-19}$ m
    (d) all of these

78. The radius of Bohr's fifth orbit for He^- is
    (a) 25×0.529 Å (b) 4×0.529 Å (c) $25 \times 0.529 \times 4$ Å (d) $25 \times 0.529/2$

79. The energy of an electron (in eV) in Bohr's fifth orbit for H-atom, He^+, Li^{3+} respectively is
    (a) $-13.6/25$, $4 \times (13.6/25)$, $(-13.6/25) \times 9$
    (b) 13.6, 4×13.6, 9×13.6
    (c) $-13.6/25$, $(-13.6/25) \times ¼$, $(-13.6/29 \times 1/9)$
    (d) none of these

80. The ionization energies of H, He^+ and Li^{2+} are in the ratio of
    (a) 1 : 4 : 9 (b) 1 : 2 : 3 (c) 1 : 1/4 : 1/9 (d) 1 : 1 : 1

81. By what factor the velocity of an electron in a Bohr's orbit for a hydrogen atom will change if the value of principal quantum number is doubled ?
    (a) velocity is halved
    (b) velocity is doubled
    (c) velocity is quadrupled
    (d) velocity remains unchanged

82. Bohr's atomic model added to the Rutherford atom the restriction that
    (a) only certain electron orbits are allowed
    (b) all nuclei of a given element have the same charge
    (c) all electrons have the same mass
    (d) light is emitted by orbiting electron

83. An electron emits energy
    (a) because it is in orbit
    (b) when it jumps from one energy level to another
    (c) electrons are attracted towards the nucleus
    (d) the electrostatic force is insufficient to hold the electrons in orbits

84. Each line of the Balmer series represents a (an)
    (a) electron orbit
    (b) energy level
    (c) angular momentum
    (d) jump from one orbit to another

85. If an electron drops from 7.9 ev leve to the 5.0 ev, it
    (a) gains 2.9 ev of K.E.
    (b) gains 2.9 ev of P.E.
    (c) emits a 2.9 ev photon
    (d) emits a 2.9 ev electron

86. Bracket series of hydrogen spectrum lies in the
    (a) Far infra red region (b) visible region (c)u.v. region (d) near infra-red region

87. The second member of Paschen series in hydrogen spectrum is due to electronic transition from
    (a) n = 3 to n = 2 (b) n = 4 to n = 3 (c) n = 5 to n = 3 (d) n = 5 to n = 4

88. The energy of an electron in nth Bohr's orbit for hydrogen atom is
    (a) $13.6/n^4$ eV (b) $13.6/n^3$ eV (c) $-13.6/n^2$ eV (d) –13.6/neV

89. The maximum difference in energy for H-atom is between
    (a) n = 5 and n = 4 (b) n = 5 and n = 3 (c) n = 5 to n = 2 (d) n = 2 and n = 1

90. According to Bohr's theory, the angular momentum for an electron is
    (a) 2.5 h/π (b) 5 h/π (c) 25 h/2π (d) 5 π/2h

91. The Rydberg relation between all hydrogen atoms spectral lines is $1/\lambda = R\left[1/n_1^2 - 1/n_2^2\right]$. The shortest wave length of a photon that can be emitted when an electron jumps from the n=4 state is
    (a) 1/R (b) 16/15 R (c) 36/5 R (d) 144/7 R

92. Consider the three electron jumps for the H-atom
    (A) n = 2 to n = 1 (B) n = 3 to n = 2 (C) n = 4 to n = 3

In which electronic transition, photon of highest wavelength is emitted, and electron experiences largest change in orbit radius?
(a) A, A (b) A, B (c) B, C (d) C, C

93. Which electron configuration would allow a hydrogen atom to absorb a photon of radiant energy, but not emit a photon?
(a) 15 (b) 25 (c) 35 (d) none of these

94. Classical mechanics is expected to be inadequate to explain the behaviour of
(a) air at 25ºC, 1 atm
(b) a ping pong ball
(c) the earth's rotation around the sun
(d) a nitrogen atom in a N_2 molecule

95. The spectral line obtained when an electron jumps from n = 5 to n = 2 belongs to the
(a) Balmer series (b) Lyman series (c) Paschen series (d) Pfund series

96. The energy of an electron in 2^{nd} Bohr's orbit for H-atom is –3.42 ev. The energy of the 2^{nd} orbit of the He^- ion will be
(a) –6.82 ev (b) –13.62 ev (c) –1.70 ev (d) –0.85 ev

97. The energy of the nth Bohr orbit for H-atom is given by $E_0 = -2.18 \times 10^{-18}/n^2$ J. The frequency of the light emitted when an electron jumps from the n = 3 to n = 1 is
(a) 1.65×10^{15} sec^{-1} (b) 1.65×10^{16} sec^{-1} (c) 1.65×10^{17} sec^{-1} (d) 1.65×10^{10} sec^{-1}

98. What is the size of the quantum of radiant energy (in ev) that would cause an electron to jump from the first to the second energy level in hydrogen ?
(a) 10.18 ev (b) 1.62×10^{-11} J (c) 1.62×10^{-19} J (d) none of these

99. Which one of the following species will give a series of spectral lines similar to that of Mg^{2+}?
(a) Al^{3+} (b) Na (c) Mg^+ (d) F

100. In Rydberg's equation for H-atom, what is the value of n_1 for observations made in the visible region?
(a) 1 (b) 2 (c) 3 (d) 4

101. Which of the following statements regarding the spectrum of mono hydrogen is false
(a) The lines can be desired by quantum numbers
(b) the line of largest wavelength in the Balmer series corresponds to a transition between the n = 2 and n = 3 levels
(c) the spectral lines are closer together at longer wave lengths
(d) a continuous occurs at n =

102. An electron moves with a speed of 0.01 times the speed of light. Its de-Broglies wave length is calculated to be
(a) 1.2×10^{-10} m (b) 2.4×10^{-10} m (c) 27.3×10^{-25} m (d) 2.4×10^{-16} m

103. A hydrogen molecule at 200ºC is moving with a speed of 2.4×10^5 cm per sec. The de-Broglie's wave length is of the order of
(a) 10,000 Å (b) 1. Å (c) 5.000 Å (d) 5 Å

104. A particle shall have associated with it a longer wave length when it is moving at
(a) 10^3 m/sec (b) 10^4 m/sec (c) 10^5 m/sec (d) 10^6 m/sec

105. The wave nature of an electron was verified experimentally by
(a) Einstein (b) Germer (c) de-Broglie (d) Planck

106. The construction of electron microscope is based upon

(a) de-Broglie's concept
(b) Uncertainty principle
(c) Pauli's principle
(d) Hund's rule

107. In the de-Broglie model, the circumference of each electron orbit must be equal to
(a) the diameter of an electron
(b) the electron wave-length
(c) an integral number of electron wave lengths
(d) Planck's constant divided by 2

108. The Franck-Hertz experiment showed that
(a) electrons can have only certain values of energy
(b) atoms can accept energy only in certain discrete amounts
(c) the energy of an electron can be measured
(d) the energy of an electron is the same as that of an emitted photon

109. Heisenberg's uncertainty principle precludes the exact simultaneous measurement of
(a) charge density and probability
(b) position and momentum
(c) position and direction
(d) velocity and energy

110. The uncertainty in the momentum of an electron is 1×10^{-6} kg m sec^{-1}. The uncertainty in position would be
(a) 1.05×10^{-23} m (b) 2.1×10^{-25} m (c) 1.05×10^{-27} m (d) 1.05×10^{-25} m

111. Which of the following orbits do not make sense according to wave mechanics ?
(a) 2d (b) 4f (c) 6h (d) 7g

112. Which of the following quantum numbers does not follow from SWE ?
(a) principal quantum number, n
(b) azimuthal quantum number, 1
(c) magnetic quantum number, m
(d) spin quantum numbers

113. Spin quantum number was introduced experimentally by
(a) Niels Bohr
(b) Sommerfield
(c) Zeeman
(d) Stern and Gerlach

114. The splitting of lines under the influence of magnetic field is called
(a) Zeeman effect (b) Raman effect (c) Thompson effect (d) Stark effect

115. Which one of the following statements is wholly correct ?
(a) all electrons in each valency shell are defined by the same principal quantum number
(b) p_x, p_y, p_z orbitals defined by the same principal quantum number differ very slightly in energy
(c) there is a reasonable chance of finding an electron in a nodal region
(d) electrons of highest energy those nearest to the nucleus

116. The term atomic orbital refers to

(a) a circular path
(b) an elliptical path
(c) an energy level
(d) a volume of space

117. The atomic number of an element is related to
(a) its atomic weight
(b) the number of neutrons in the nucleus
(c) its mass number
(d) the x-ray spectrum of the element

118. Elements have been identified by their recurring spectra. This happens because
(a) protons have definite energy levels
(b) electrons have definite energy levels
(c) every element reflects light differently
(d) every element has a fixed ratio of isotopes

119. Radiant energy is emitted from an atom when electrons fall back to lower energy levels. The electron change that would release the most energy occurs when an electron jumps from
(a) L to K shell (b) M to L shell
(c) M to K shell (d) M to N shell

120. The Pauli exclusion principle states that
(a) two and only two electrons of the same atom can occupy the same principal quantum level
(b) no more than two electrons of the same atom can have identical sets of four quantum numbers
(c) no two electrons of the same atom can occupy the same principal quantum level
(d) no two electrons of the same atom can have identical sets of four quantum numbers

121. The maximum number of electrons in the second quantum level is
(a) 10 (b) 2 (c) 8 (d) 6

122. The number of electrons which can be accomodated in an electronic sub-level with 1 = 2 is
(a) 2 (b) 6 (c) 10 (d) 14

123. The maximum number of electrons in the 3^{rd} orbital is
(a) 2 (b) 6
(c) 5 (d) 10

124. What is the total electron capacity of the energy level for which n = 4 ?
(a) 8 (b) 16
(c) 18 (d) 32

125. The possible values of the magnetic quantum number m of a 2p electrons are
(a) 0, 1, 2
(b) 1, 2, 3
(c) –1, 0, +1
(d) –2, –1, 0, +1, +2

126. The maximum number of electrons which occupy a dz^2 orbital is
(a) 1 (b) 2
(c) 3 (d) 5

127. Consider the four orbitals in a calcium atom 2p, 3p, 3d and 4s. These orbitals are arranged in order of increasing energy is
(a) 2p < 3p < 3d < 4s
(b) 2p < 3p < 4s < 3d
(c) 2p < 4s < 3p < 3d
(d) 4s < 2p < 3p < 3d

128. Which of the following orbital is impossible according to wave mechanics >
(a) 3f (b) 4f
(c) 5g (d) 6h

129. The element whose neutral isolated atoms have three half filled 2p orbitals is
(a) $_5B$ (b) $_6C$
(c) $_7N$ (d) $_8O$

130. Which one of the following species has the same electronic configuration as (isoelectronic) with the argon atom ?
(a) Ne (b) Na
(c) S^{2+} (d) Cl^-

131. Which one of the following group of atom or ions is not iso-electronic
(a) He, H^-, Li^+ (b) Na^+, Mg^{2+}, Al^{3-}
(c) F^-, O^{2-}, N^{3-} (d) K^+, Ca^{2+}, Ne

132. Which one of the following is sio-electronic?
(a) K^-, Ca^{2+}, Ar (b) Cl^-, S^{2-}, N^{3-}
(c) F^-, Cl^-, Br^- (d) Al^{3+}, Ca^{2+}, Ar

133. The Ca^{2+} ion has the same number of electrons as
(a) V^{3+} (b) Ne
(c) C_2H_6 (d) Mg^{2+}

134. Which halogen has the greatest electron affinity ?
(a) F (b) Cl
(c) Br (d) I

135. Which halogen has the greatest electron-negativity ?
(a) F (b) Cl
(c) Br (d) I

136. The electronic configuration of the oxide ion, O^{2-}, may be represented as
(a) $1^2\ 2s^2\ 2p^4$
(b) $1s^2\ 2s^2\ 2p^6$
(c) $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^2$
(d) $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6$

137. Which of the following represents a reasonable set of quantum number of a 3d electron ?
(a) 3, 2, –2, +1/2 (b) 4, 2, –2, +1/2
(c) 3, 2, 0, –1/2 (d) 3, 2, –1, +1/2

138. The last electron of an element has n = 4, l = 3, m = –2, s = +1/2. What is the atomic number of the element ?
(a) 21 (b) 39
(c) 58 (d) 57

139. The proper set of four quantum numbers for valency electron of $_{37}Rb$ is
(a) 5, 0, 0, +1/2 (b) 5, 1, 0, +1/2
(c) 5, 1, 1, +1/2 (d) 6, 0, 0, +1/2

140. The electronic configuration which represents an alkaline earth metal is
(a)(Ar) $4s^{-1}$ (b)(Ar) $4s^2$
(c)(Ar) $3d^{10}$ $4s^2$ (d)(Ar) $4s^2$ $4p^2$

141. Which is the electronic configuration of the most reactive non-metal ?
(a)(Ne) $3s^1$ (b)(Ne) $3s^2$ $3p^5$
(c)(Ne) $3s^2$ (d)(Ne) $3s^2$ $3p^1$

142. What is the electronic configuration of first transition metal ?
(a)$(Ar)^{18}$ $3d^1$ $4s^2$ (b)$(Kr)^{36}$ $4d^1$ $5s^2$
(c)$(Xe)^{54}$ $5d^1$ $6s^2$ (d)(Xe) $4f^1$ $5d^1$ $6s^2$

143. Which transitional metal has outer $3d^6$ $4s^2$ configuration ?
(a) Mn (b) Cr
(c) Fe (d) Co

144. The magnetic moment of Cr atom (in Bohr's magnetron) is
(a) 1.73 (b) 2.83
(c) 3.87 (d) 6.92

145. The number of unpaired electrons in Ni^{2+} ion is
(a) 4 (b) 3
(c) 2 (d) 1

146. Which one of the following ions has the largest number of unpaired electrons ?
(a) Mn^{2+} (b) Fe^{2+}
(c) Cu^{2+} (d) Zn^{2-}

147. Which one of the following species would have an odd number of electrons ?
(a) N (b) N^-
(c) NO^- (d) NO_2^-

148. The electronic configuration of Cu is
(a)(Ar) $3d^9$ $4s^2$ (b)(Ar) $3d^{10}$ $4s^1$
(c)(Ar) $3d^8$ $4s^2$ $4p^1$ (d) none of these

149. Which one of the following ions has only one unpaired electron ?
(a) Cu^{2+} (b) Cr^{3+}
(c) Fe^{2+} (d) Cu^+

150. Which are of the group of ions does not have fully-filled d-orbitals ?
(a) Cu^+, Ag^+, Au^{3+} (b) Zn^{2+}, Cd^{2+}, Hg^{2+}
(c) Pd^0, Au^{3+}, Hg^{2+} (d) M_0^{3+}, Cr^{3+}, Fe^{3+}

151. Which one of the following is the ground state electronic configuration of gadolimum (Z) ?
(a)(Xe) $4f^1$ $5d^1$ $6s^2$
(b)(Xe) $4f^0$ $5d^1$ $6s^2$
(c)(Xe) $4f^{14}$ $5d^1$ $6s^2$
(d)(Xe) $4f^{14}$ $5d^2$ $6s^2$

152. The electronic configuration of element which follows the lanthanides is
(a)(Xe) $4f^{14}\ 5d^1\ 6s^2$ (b)(Xe) $4f^0\ 5d^1\ 6s^2$
(c)(Xe) $4f^1\ 5d^1\ 6s^2$ (d)(Xe) $4f^{14}\ 5d^2\ 6s^2$

153. The approximate atomic weights of elements was determined by use of
(a) Dulong-Petit's Law
(b) Mass spectrograph
(c) Cannizaro's principle
(d) V.D. measurement

154. The first attempt at classification of elements using atomic weights as the basis of classification was due to
(a) Doberneir (b) Lother Meyer
(c) Mendeleev (d) Moseley

155. Mendeleev's classification of elements was useful
(a) in prediction of new elements
(b) corrections of doubtful atomic weights
(c) as stimulus in research
(d) all of these

156. Mendeeleev's periodic table failed to find position for
(a) isotopes
(b) lanthanides
(c) isotopes of hydrogen
(d) all of these

157. The modern classification of element is based upon
(a) atomic weight (b) atomic number
(c) atomic volume (d) density

158. Isotopes of hydrogen atoms differ in the number of
(a) electrons (b) protons
(c) neutrons (d) energy-levels

159. Decimal atomic masses are due to mixture of
(a) isomers (b) impurities
(c) allotropes (d) isotopes

160. The mass of one atom of iodine is
(a) 127/N (b) 254/N (c) N/127 (d) N/254

161. In a given row of the periodic table, the atomic number of the elements increases, the first ionization energy of each element generally
(a) increases
(b) decreases
(d) first decreases, then increases
(e) remains the same

162. Given the data for ionization energies for atom X

I.E.	**k cals/mole**
1^{st}	258
2^{nd}	555

3^{rd}	1075
4^{th}	1480
5^{th}	9350

The most probable number of valency electrons for atom X is

(a) 5 (b) 2 (c) 3 (d) 4