CHEMISTRY

BOOKS - V PUBLICATION

STRUCTURE OF ATOM

Question Bank

1. Calculate the number of electrons which will together weigh one gram?

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2. Calculate the total number of electrons present in one mole of methane

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3. How many néutrons and protons are there in the following nuclei

$_ 6^3C,_8^{16}O,_{12}^{24}Mg,_{26}^{56}Fe,_{38}^{88}Sr$

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4. Write the complete symbol for the atom with the given atomic number (Z) and atomic mass(A) :

i) Z= 17, A=35

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5. Yellow light emitted from a sodium lamp has a wavelength '(lambda)' of '580 nm .' Calculate the frequency ('v') and wavenumber ('barv') of the yellow light.

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6. Find energy of each of the photons which

i. corresponds to light of frequency '3 x 10^(15) Hz'

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7. Calculate the wavelength, frequency and wave riumber of a light wave whose period is '2.0 xx 10^(-10) s'

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8. What is the number of photons of light with a wavelength of 4000 pm that provide 1 J energy?

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9. A photon of wavelength '4 xx 10^(-7) m' strikes on metal surface, the work function of the. metal being '2.13 eV .' Calculate (i) the energy of the photon '(eV)',

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10. Electromagnetic radiation of wavelength 242 nm is just sufficient to ionise the sodium atom. Calculate the ionisation energy of sodium in kJ mol^{-1}

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11. A 25 watt bulb emits monochromatic yellow light of wavelength of '0.57 mu . m .' Calculate the rate of emission of quanta per second.

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12. Electrons are emitted with zero velocity from a metal surface when it is exposed to radiation of wavelength 6800 $\overset{\circ}{A}$. Calculate the threshold frequency (v_0) and work function (w_0) of the metal.

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13. What is the wavelength of light emitted when the electron in a hydrogen atom undergoes transmission from n=4 to n=2? ($R_H = 109677 cm^{-1}$)

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14. How much energy is réquired to ionise a 'H' atom if the electron occupies 'n=5' orbit? Compare your answer with the ionisation

enthalpy of 'H' atom (energy required to remove the electron from 'n=1' orbit).

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15. What is the maximum number of emission lines when the excited electron of a hydrogen atom in n = 6 drops to the ground state?

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16. i. The energy associated with the first-orbit in the hydrogen atom is $-2.18 \times 10^{-18} J$ atom^(-1)`. What is the energy associated with the fifth orbit?

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17. Calculate the wave number for the longest wave length transition in the. Balmer series of atomic hydrogen.

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18. What is the energy in joules required to shift the electron of the hydrogen atom from the first Bohr orbit to the fifth Bohr orbit and what is the wavelength of the light emitted when the electron returns to the ground state? The ground state electron energy is -2.18×10^{-11} ergs. $\left(1erg = 10^{-7}J\right)$

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19. Calculate the energy required to remove an electron completely from n = 2 orbit of hydrogen atom, What is the longest wavelength of light in cm that can be used to cause this transition?

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20. Calculate the wavelength of an electron moving with a velocity of $2.05 \times 10^{7} ms^{-1}$

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21. The mass of an electron is 9.1×10^{-31} kg. If its K.E.is 3.0×10^{-25} J,then calculate it's wavelength

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22. Which of the following are isoelectronic species?

$Na^+, K^+, Mg^{2+}, Ca^{2+}, S^{2-}, Ar$

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23. i. Write the electronic configuration of the following ions: (a) 'H^-' (b) 'Na^+ ' (c) 'O^(2-)'(d) 'F^-'

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24. What is the lowest value of 'n' that allows 'g' orbitals to exist?

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25. An electron is in one of the '3 d' orbitals. Give the possible values of 'n, l' and 'm and s for this electron.

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26. An atom of an element contains 29 electrons and 35 neutrons. Deduce (i) the number of protons and (ii) the electronic configuration of the element.

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27. Give the number of electrons in thé species 'H_2^+, H_2' and 'O_2^+'.

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28. An electron is in one of the '3 d' orbitals. Give the possible values of 'n, l' and 'm and s for this electron.

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29. Using s, p, d, f notation represent the sub-shell with the following quantum numbers.

i) n=1, l=0

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30. Which of the following sets of quantum numbers are NOT possible?

$n = 1, l = 0, m_l = 0, m_s = -\frac{1}{2}$

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31. How many electrons in an atom may have the following quantum numbers? $n = 4, m_s = -\frac{1}{2}$

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32. Show that the circumference of the Bohr orbit for the hydrogen atom is an integral multiple of the de Broglie wavelength associated with the electron revolving around the orbit.

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33. What is the wavelength of light emitted when the electron in a hydrogen atom undergoes transmission from n=4 to n=2? ($R_H = 109677 cm^{-1}$)

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34. Calculate the energy required for the process

$He^+(g) \rightarrow He^{(2+)}(g) + e^-$ The ionization

energy for the H atom in the ground state is $2.18 \times 10^{-18} J$ atom $\hat{}$ (-1).

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35. If the diameter of a carbon atom is '0.15 nm', calculate the number of carbon atoms which can be placed side by side in a straight line across length of scale of length 20 cm long.

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36. 2 xx 10^8' atoms of carbon are arranged side by side. Calculate the radius of carbon atom if the length of this arrangement is '2.4 cm .'

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37. The diameter of zinc atom is '2.6A. Calculate

(a) radius of zinc atom in pm

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38. A certain particle carries '2.5 xx 10^(-16) C' of static electric charge. Calculate the number of electrons present in it.

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39. In Millikans experiment, static electric charge on the oil drops has been obtained by shining X-rays. If the static electric charge on the oil drop is '-1.282 xx 10^(-18) C'. Calculate the number of electrons present on it.

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40. In Rutherfords experiment, generally the thin foil of heavy atoms, like gold, platinum etc. have been used to be bombarded by the 'alpha' -particles. If the thin foil of light atoms like aluminium etc. is used, what difference would be observed from the above results?

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41. Symbols $_{35}^{79}Br$ and $_{}^{79}Br$ can be written, whereas symbols $_{79}^{35}Br$ and

$_{}^{35}Br$ are not acceptable. Answer briefly.

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42. An element with mass number 81 contains '31.7 %' more neutrons as compared to protons. Assign the atomic symbol.

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43. An ion with mass number 37 possesses one unit of negative charge. If the ion contains '11.1

%' more neutrons than the electrons, find the symbol of the ion.

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44. An ion with mass number 56 contains 3 units of positive charge and '30.4 %' more neutrons than electrons. Assign the symbol to this ion.

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45. Arrange the following type of radiations in increasing order of frequency:

(a) radiation from microwave oven, (b) amber light from traffic signal, (c) radiation from FM radio, (d) cosmic rays from outer space and (e) X-rays.

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46. Nitrogen laser produces a radiation at a wavelength of 337.1 nm. If the number of

photons emitted is 5.6×10^{24} per second, calculate the power of this laser.

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47. Neon gas is generally used in the sign boards. If it emits strongly at '616 nm', calculate (a) the frequency of emission,

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48. In astronomical observations, signals observed from the distant stars are generally weak. If the photon detector receives a total of '3.(15) xx 10^(-18) J' from the radiations of '600 nm', calculate the number of photons received by the detector.

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49. Life of the molecules in the excited states are often measured by using pulsed radiation

source of duration nearly in the nano second range. If the radiation source has the duration of 2 ns and the number of photons emitted during the pulse source is '2.5 xx 10^(15)', calculate the energy of the source.

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50. The longest wavelength doublet absorption transition is observed at 589 and '589.6 nm'. Calculate the frequency of each

transition and energy difference between two excited states.

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51. The work function for Ceasium atom is 1.9 eV. Calculate the threshold frequency

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52. The ejection of the photoelectron from the silver metal in the photoelectric effect :

experiment can be stopped by applying the yoltage of '0.35 V' when the radiation '256.7 nm' is used. Calculate the work function for silver metal.

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53. If the photon of the wavelength 150 pm strikes an atom and. one of its inner bound electrons is ejected out with a velocity of '1.5 xx 10^7 ms^(-1)'. Calculate the energy with which it is bound to the nuclëus.

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54. Emission transitions in the Paschen series end at orbit n=3 and start from orbit n and can be represented as $v = 3.29 \times 10^{15}$(H z) $\left[\frac{1}{3^2} - \frac{1}{n^2}\right]$: Calculate the yalue of 'n' if the transition is observed at 1285nm. Find the region of the spectrum.

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55. Calculate the wavelength for the ėmission transition if it starts from the orbit hav- ing radius '1.3225 nm' and ends at '211.6 pm'. Name the series to which this transition belongs and the region of the spectrum.

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56. Dual behaviour of matter proposed by de Broglie led to the discovery of electron microscope oftenused for the highly magnified

images of biological molecules and othér type of material. If the velocity of the electron in this microscope is '1.6 xx 10^6 ms^(-1)', calculate de Broglie wavelength associated with this electron.

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57. If wavelength of neutron beam used in neutron microscope is 800 pm, calculate the velocity associated with the neutron (Mass of neutron $1.675 \times 10^{-27} kg$)

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58. If the velocity of the electron in Bohrs first orbit is '2.19 xx 10^6 ms^(-1)', calculate the de Broglie wavelength associated with it.

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59. The velocity aśsociated with a proton moving in a potential difference of '1000 V' is '4.37 xx 10^5 ms^(-1)'. If the hockey bail of mass

'0.1 kg' is moving with this velocity, calculate the wavelength associated with this velocity.

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60. A mathematical representation is given below:

$$\Delta X \times \Delta p_x \geq \frac{h}{4\pi}$$

b) If the position of the electron is measured within an accuracy of ± 0.002 nm. Calculate the uncertainty in the momentum of the electron.

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61. The quantum numbers of 2 electrons are given below. Arrange them in order of increasing energy

$n = 3, l = 2, m_l = 1, m_s = +\frac{1}{2}$

$n = 4, l = 1, m_l = 0, m_s = +\frac{1}{2}$

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62. The bromine atom possesses 35 electrons. It contains 6 electrons in '2 p' orbital, 6

electrons in '3 p' orbital and 5 electrons in '4 p' orbital. Which of these electrons experiences the lowest effective nuclear charge?

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63. Among the following pairs of orbitals which orbital will experience the larger effective nuclear charge? (i) '2 s' and '3 s',

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64. The unparied electrons in Al and Si are in 3p orbital. Which electrons will experience more effective nuclear charge from the nucleus?

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65. Indicate the number of unpaired electrons in (a) 'P'

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66. How many sub - shells are associated with n=4?

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67. How many electrons in an atom may have the following quantum numbers?

$n = 4, m_s = -\frac{1}{2}$

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68. What are 'n, l' and 'm' values for '2 Px' and '3 Pz' electrons?

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69. Arrange the following orbitals in the order in which electrons may be normally expected to fill them

$3s, 2p, 3p, 2s, 3d, 4s$

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70. An atom has '2 K, 8 L', and '5 M' electrons. Write electronic configuration of the atom. How many unpaired electrons are there in the atom?

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71. Write the various possible quantum numbers for unpaired electron of Aluminium atoms?

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72. What is the difference between a quantum and a photon.

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73. Nucleus of an atom has 6 protons and 8 neutrons. What is its atomic number and mass number? What is this element?

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74. Account for the following:

a. The expected electronic configuration of copper is '[Ar] 3d^9 4s^2' but actually it is '[Ar] 3 d^(10) 4 s^1'

b. In building up of atoms, the filling of 4s orbitals occurs before '3 d' - orbitals.

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75. a. Differentiate between orbit and orbital

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76. a. When energy of eleçtron is to be taken to zero?

b. Which of the following orbitals are not possible? Give reasons $3s$, $1p$, $4f$, $2d$

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77. Quantum numbers provide complete information about electrons in an atom.

a. Four sets of quantum numbers are given below. Select the possible set of quantum

numbers.

i. $n = 3, l = 1, m = 1, , s = \ + \frac{1}{2}$

ii. $n = 4, , l = 1, , m = 1, s = \ + \frac{1}{2}$

iii. $n = 1, l = 0, m = 0, , s = \ + \frac{1}{2}$

iv. $n = 2, l = 2, m = 1, , s = \ + \frac{1}{2}$

b. Give the quantum numbers of the valencè electron of an atom with atömic number 19.

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78. Dual nature of matter was proposed by Louis-de-Broglie.

b) State Paul's exclusion principle and Hund's rule of maximum multiplicity.

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79. The photoelectric effect was first observed by H.Hertz.

What is photoelectric effect?

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80. What is the difference between emission spectra and absorption spectra?

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81. Write a short note on plancks quantum theory.

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82. Does the angular momentum of an electron in an atom depend on the principal quantum number (n)?

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83. Discuss the similarities and differences between a '1s' and a '2s' orbital.

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84. Choose the electronic configurations that are possible from among the following. Explain why the others are impossible.

a '1 s^2 2 s^3 2 p^6'

b '1s^2 2 s^2 2 p^4'

C '1 s^2 2 s^2 2 p^8 3 s^2 3 p^6 3 d^7'

d '1 s^2 2 s^2 2 p^6 3 s^2 3 d^9'

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85. What extraordinary assumption was made by Einstein while explaining the photo electric effect?

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86. Which experiment led to the discovery of neutrons?

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87. J.J.Thomson proposed his atom model in 1898.

a)Explain Thomson's model of atom

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88. Four imporfant properties of cathode rays

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89. Explain why atoms with half filled and completely filled orbitals have extra stability.

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90. Consider the following configuration.

I . '1 s^2 2s^1'

II . '1 s^2 3 s^1'

a) Name the element corresponding to configuration I.

b) Döes the configuration II correspond to the

same element or different element?

c) How can II be obtained from I?

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91. What experimental evidence requires that the emission of energy by an atom must be quantized.

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92. What will be the maximum number of electrons of same spin present in an atom having 'n+l=4'

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93. Calculate the wave length of an electron that has been accelerated in a particle accelerator through a potential difference of 100 million yolts. '(1 e V=1.6 xx 10^(-19)J, m_e.'

'.=9.1 xx 10^(-31) kg, h=6.6 xx 10^(-34) Js, C=3.0 xx 10^8 ms^(-1))'

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94. The quantized energy of an electron in hydrogen atom for the n^{th} it level is given by $E_n = \frac{1.312}{n^2} \times 10^6 Jmol^{-1}$, Calculate the energy required to remove the electron completely from an excited hydrogen atom when its quantized level, $n = 3$, $\left(N_A = 6.02 \times 10^{23} mol^{-1}\right)$

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95. The sodium flame test has a characteristic yellow colour due to emissions of wavelength '589 nm .' What is mass equivalence of one photon of this wavelength? '(h= 6.626 xx 10^-(34) Js)'

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96. The ionisation energy of sodium is '494.7 kJ' mol '^(-1)'. Calculate the wavelength of the

electromagnetic radiation which is just sufficient to ionise the sodium atom. [Given: '.C=3 x 10^8 ms^(-1), h=6.6 x 10^(-34) Js, N_A=6.02 x 10^(23) mol^(-1)]'

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97. An electron is moving with kinetic energy of '2.275 xx 10^(-25) J .' Calculate its de Broglie wavelength: '(m_e=9.1 xx 10^(-31), kg, h=6.6 xx 10^(-34) Js)'

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98. What is the wavelength of an electron if its kinetic energy is '4.55 xx 10^(-25)' Joules? (Mass of electron '=9.1 xx 10^(-31) kg' and 'h=6.6 xx 10^(-34) kgm^2 s^(-1)')

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99. Electrons with wavelength '12 pm' are used for electron diffraction. What is the velocity of these electrons?

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100. A radiation has a frequency of '6 xx 10^(14)' cycles per second (or 'Hz'). Calculate the wavelength of the radiation in nanometers '(In m=10^(-9)m)'

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101. Calculate the energy of a radiation having a wavelength of '4000 A (h=6.6 xx 10^(-34)) J s)'

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102. Calculate the wavelength of the first and the last line in the Balmer series of the hydrogen spectrum.

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103. Calculate the uncertainty in momentum of an electron if uncertainty in its. position is '1A ^circ (10^(-10)m)'

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104. Find (i) the total number and (ii) the total mass of neutrons in 7 mg of $_{}^{14}C$ (Mass of neutron $= 1.675 \times 10^{-27} kg$)

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105. A neutral atom possesses 92 protons and 146 neutrons. Find its atomic number, mass number and number of electrons present in it.

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106. A photon of wave length $400nm$ strikes a metal surface. The electrons are ejected with a velocity $5.85 \times 10^5 ms^{-1}$. Calculate the minimum energy required to remove an electron from the metal surface. The mass of an electron is $9.109 \times 10^{-(31)} kg$.

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107. Nitrogen has the electronic configuration '1 s^2 2 s^2 p_x^1 2 p_y^1 2 p_z^1' and not '1 s^2

2 s^2 2 p_x^2 2 p_y^1 2 p_z^0' which is determined by

A. Pauli exclusion principle

B. Aufbau principle

C. Hund's rule

D. Uncertainty principle

Answer: C

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108. The correct set of quantum numbers for the unparied electron of 'Cl' atom is

A. 2,0,0,+1/2'

B. 2,1,(-1),+1/2'

C. 3,1,(-1), +- 1/2'

D. 3,0,0, +-1/2'

Answer: C

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109. Which of the following represents a correct set of quantum numbers of a '4 d' electrons?

A. 4,3,2,+1/2'

B. 4,2,1,0'

C. 4,3,-2,+1/2'

D. 4,2,1,-1/2'

Answer: D

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110. An electron has a speed of '600 m / s' with an accuracy of '0.005 % .' The certainty. with which the position of the electron can be located is

A. 1.92 xx 10^(-3) m'

B. 1.058 xx 10^(-3)m'

C. 2.69 xx 10^(-2) m'

D. 3.85 xx 10^(-2) m'

Answer: A

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111. The número of nodal planes '5d' orbital has, is

A. zero

B. one

C. two

D. three

Answer: C

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112. The total number of orbitals in a shell having principal quantum number 'n' is

A. 2 n'

B. n^2'

C. 2 n^2',

D. n+1'

Answer: B

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113. Which of the following has maximum number of unpaired electrons?

A. mg^(2+)'

B. Ti^(3+)'

C. v^(3+)'

D. Fe^(3+)'

Answer: D

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114. The electrons, identified by quantum numbers 'n' and (i) 'n=4, l=1' (ii) 'n=4, l=0' (iii) 'n=3, l=2' (iv) 'n=3, l=1' can be placed in order of increasing energy, from the lowest to the highest as

A. (iv) lt(ii)lt(iii)lt(i)

B. (ii) lt(iv)lt(i)lt(iii)

C. (c)(i)lt(iii)lt(ii)lt(iv)

D. (d)(iii)lt(i)lt(i v)lt(ii)

Answer: A

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115. The 'e / m' ratio of an electron is .....times that of an alpha particle

A. 1840

B. 3680

C. 920

D. 2

Answer: B

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116. Nitrogen has the electronic configuration '1 s^2 2 s^2 p_x^1 2 p_y^1 2 p_z^1' and not '1 s^2 2 s^2 2 p_x^2 2 p_y^1 2 p_z^0' which is determined by

A. Aufbau principle

B. Pauli's exclusion principle

C. Hund's rule

D. Uncertainty principle

Answer: C

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117. Which of the following is correct?

A. _1^1 H' and '_2^3 He' are isotopes

B. _6^(14) C' and ' _7^(14) C' are isotopes

C. _(19)^(39) K' and ' _(20)^(40) C' a are isotones

D. None of these

Answer: C

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118. Which of the following relates fo photons both as wave motion and as stream particles?

A. Interference

B. diffraction

C. E=h v'

D. E=mc^2'

Answer: C

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119. Electromagnetic radiaition with maximum wavelength is

A. ultraviolet

B. radiowave

C. X-rays

D. infrared

Answer: B

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120. The uncertainty in the momentum of an electron is '1 xx 10^(-5) kg ms^(-1)'. The uncertainty in its position will be '(h=6.62 xx 10^(-34) kg m s^(-1))'

A. 1.05 xx 10^(-28) m'

B. '1.05 xx 10^(-26) m'

C. 5.27 xx 10^(-30)m'

D. 5.25 xx 10^(-28)m'

Answer: C

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121. The orbital angular momentum of an electron in s orbital is

A. +-1/2 h/2 pi'

B. +h/2 pi'

C. zero

D. 'sqrt2 h/2pi'

Answer: C

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122. The quantum number '+1/2' and '-1/2' for the electron spin represent.

A. rotation of the electron in clockwise and anticlockwise direction respectively

B. rotation-of the electron in anti-clockwise direction respectively

C. magneti moment of the electron pointing up and down respectively

D. Two quantum mechanical spin states which have no classical analogue

Answer: C

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123. The value of Plancks constant is

A. 6.03 xx 10^(23)' mols

B. 6.03 xx 10^(-34) Js^(-1)'

C. 6.626 xx 10^(-34) Js'

D. 6.63 xx 10^(34) Js'

Answer: C

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124. The energy of electron in 3rd orbit of hydrogen atom is:

A. -1311.8 kJ mol^(-1)'

B. '-82.0 kJ mol^(-1)'

C. -145.7 kJ mol^(-1)'

D. -327.9 kJ mol^(-1)'

Answer: C

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125. Which of the following is not possible?

A. n=3, l=2, m=0'

B. n=1, l=0, m=0'

C. n=3, l=3, m=2'

D. n=4, l=3, m=-3'

Answer: C

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126. Which radiations has largest energy?

A. lambda=30 nm'

B. lambda=300 pm'

C. v=3 xx 10^(12)s^(-1)'

D. v=3 xx 10^(10)s^(-1)'

Answer: B

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127. The energy of the electron in the 'n^(th) ' orbit of hydrogen atom is given as:

'E_n=(-1311.8)/n^2 k J m o l^(-1)'

What is the energy emitted per atom when an electron jumps from third energy level to second energy level?

A. 329.7 kJ'

B. 3.03 xx 10^(-19)J'

C. 182.2 kJ'

D. 145.7 kJ'

Answer: B

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128. The maximum number of electrons in a subshell is given by the expression:

A. 4 l-2'

B. 4 l+2'

C. 2 l+1'

D. 2 n^2'

Answer: B

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129. For a particular value of azimuthal quantum number '(l)' the fotal number of magnetić quantum number (m) is givne by:

A. l=(m+1)/2'

B. l=(m-1)/2'

C. l=(2 m+1)/2'

D. m=(2 l-1)/2'

Answer: B

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130. Consider the following ions: 1. $Ni^{(2+)}$ 2. $Co^{(2+)}$ 3. $Cr^{(2+)}$ 4. $Fe^{(3+)}$ (Atomic number : $Cr:24$, $Fe=26, Co=27$ and $Ni=28$

The correct sequence of increasing numbr of unpaired elecrons in these ions is $1, 2, 3, 4$; $4, 2, 3, 1$; $1, 3, 2, 4$; $3, 4, 2, 1$

A. 1,2,3,4'

B. 4,2,3,1'

C. 1,3,2,4'

D. 3,4,2,1'

Answer: A

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131. The ratio of the difference in energy between the first and the second Bohar orbit to that between second and third Bohr orbit is

A. 12'

B. 1/3'

C. 27/5'

D. 4/9'

Answer: C

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132. The radial part of wave function depends on the quantum numbers.

A. n, l'

B. n only

C. I_m_l'

D. l' only

Answer: A

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133. The orbital angular momentum of an electron in s orbital is

A. zero

B. h/2 pi'

C. sqrt2 h/2 pi'

D. 1/2 . h/2 pi'

Answer: B

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134. If the nitrogen atom had electronic configuration '1 s^7', it would have energy lower than that of the normal ground state configuration '1 s^2 2 s^2 sp^3', because the

elec- trons would be closer to the nucleus. Yet, '1 s^7' is not observed because it violates:

A. Heisenberg uncertainty principle

B. Hund's rule

C. Pauli exclusion principle

D. Bohr postulate of stationary orbits

Answer: C

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135. For d-elecron the orbital angular momentum is

A. sqrt((6 h) / (2 pi))'

B. sqrt((2 h / (2 pi))'

C. h / (2 pi)'

D. (2 h) / pi'

Answer: A

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136. Time taken for an electron to complete one revolution in the Bohr orbits of hydrogen atom is

A. (4 pi^2 m r^2)/(n h)'

B. (n h)/(4 pi^2 m r)'

C. (2 pi m r^2)/(n^2 h^2)'

D. h/(2 pi m)'

Answer: A

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137. The frequency of radiation emitte when the electron falls from 'n=4' to 'n=1' in 'a' hydrogen atom will be (given ionization energy of 'H=2.1810^(-18) J' atom '^(-1)' and 'h=' '6.625 xx 10^(-34)' Js)

A. 1.03 xx 10^3 s^(-1)'.

B. 3.08 xx 10^(15) s^(-1)'

C. 2.00 xx 10^(15)s^(-1)'

D. 1.54 xx 10^(15)s^(-1)'

Answer: B

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138. The correct set of quantum numbers for the unparied electron of 'Cl' atom is

A. _(32)^(78) Ge'

B. _(34)^(78) Se'

C. _(30)^(79) Kr'

D. _(32)^(78) Ge'

Answer: B

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139. The ratio of area covered by second orbit to the first orbit is $1:1, 1:16, 8:1, 16:1$

A. 1: 1'

B. 1: 16'

C. 8: 1'

D. 16: 1'

Answer: D

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140. The relationship between energy 'E', of the radiation with at wavelength 800 A and the energy of radiaiton with a wavelength of '1600 A^\circ' is

A. E_1=6 E_2'

B. E_1=2 E_2'

C. E_1=4 E_2'

D. E_1=1/2 E_2'

Answer: B

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141. Effective magnetic moment of 'Sc^((3+))' ion is

A. 1.73 BM'

B. 0

C. 5.92 BM'

D. 2.83 BM'

Answer: B

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142. Find the magnetic.moment of a divalent ion in aqueous solution if its atomic number is 25

A. 0.0'

B. 52.9'

C. 26.5'

D. 105.8'

Answer: C

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143. Find the magnetic.moment of a divalent ion in aqueous solution if its atomic number is 25

A. 3.0 BM'

B. 4.9 BM'

C. 5.9 BM'

D. 6.9 BM'

Answer: C

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144. The correct order of number of unpaired electrons in the ions : 'Cu^((2+)), Ni^((2+)), Fe^((3+))' and 'C r^((3+))' is

A. Cu^(2+)gtNi^(2+)gtCr^(3+)gtFe^(3+)'

B. Cr^(3+)gtFe^(3+)gtNi^(2+)gtCu^(2+)'

C. Fe^(3+)gtCr^(3+)gtCu^(2+)gtNi^(2+)'

D. Ni^(2+),gtCu^(2+)gtFe^(3+)gtCr^(3+)'

Answer:

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145. 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)'

Answer: B

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146. The number of radial nodes of '3 s' and '2 p' -orbitals are respectively:

A. 2,0

B. 0,2

C. 1,2

D. 2,1

Answer: A

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147. In a multielectron atom, which of the following orbitals described by the three quantum numbers will have the sáme energy in the absence of magnetic and electric fields?

(a) 'n=1, l=0, m=0^circ'

(b) 'n=2, l=0, m=0'

(c) 'n=2, l=1, m=1'

(d) 'n=3, l=2, m=1'

(e) 'n=3 , 1=2, m=0^circ'

A. (a) and (b)

B. (b) and (c)

C. (c) and (d)

D. (d) and (e)

Answer: D

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148. Which of the following statements in relation to the hydrogen atom is correct? $3s$ orbital is lower in energy than $3p$ orbital, $3p$ orbital is lower in energy than $3d$ orbital, $3s$

and $3p$ orbitals are lower in energy than $3d$ orbital, $3s$ and $3p$ orbital all have the same energy

A. 3 s orbital is lower in energy than '3 p' orbital

B. 3 p' orbital is lower in energy than '3 d' orbital

C. 3 s' and '3 p' orbitals are lower in energy than '3 d' orbital

D. 3 s' and '3 p' orbitals all have the same energy

Answer: A

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149. 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)'.

Answer: B

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150. Which of the follawing transition will have minimum wavelength? $n_4 \rightarrow n_1$, $n_2 \rightarrow n_1$, $n_4 \rightarrow n_2, n_3 \rightarrow n_1$

A. $n_4 \rightarrow n_1'$

B. $n_2 \rightarrow n_1'$

C. $n_4 \rightarrow n_2'$

D. $n_3 \rightarrow n_1'$

Answer: A

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151. A metal surface is exposed to solar radiations

A. the emitted electrons have energy less.than a maximum value of energy depending upon the frequency of the, incident radiation

B. the emitted electrons have energy 'less than the maximum value of energy depending upon the intensity of incident radiations

C. the emitted electrons have zero energy

D. the emitted electrons have energy equal to the.energy of photons of incident light

Answer: A

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152. Electrons will fist enter into the orbital with the set of quantum numbers

A. n=5,1=0'

B. n=4,1=1'

C. n=3,1=2'.

D. any of these

Answer: C

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153. According to Bhr's theory, the angular momentum of an electron in 5 th orbit is

A. 1.0 h / pi'

B. 10 h / pi'

C. 2.5 h / pi'

D. 25 h / pi'

Answer: C

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