CHEMISTRY

BOOKS - MBD CHEMISTRY (ODIA ENGLISH)

STRUCTURE OF ATOM

Question Type

1. Calculate the wavelength and energy of radiation emitted for the electronic transition

from infinity (∞) to stationary state of one of hydrogen atom.

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2. Calculate the momentum of a particle which has a de Brogile wavelength of 0.1m.

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3. Two particles A and B are in motion. If the wavelength associated with the particle A is

$5 \times 10^{-5} m$, calculate the wavelength of particle B, if its momentum is half of A.

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4. Calculate frequency and wave number of radiation having wavelength 600 nm.

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5. The wave number of a beam of light is 400 cm^(-1). What is the wavelength of light in

nanometres ?

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6. Calculate the wavelength, frequency and wave number of a light whose period $2.0 \times 10^{-10} s$.

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7. Calculate and compare the energies of two radiations, one with a wavelength of 400 nm

and the other with 800 nm.

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8. The minimum energy required for the photoemission of electron from the surface of a metal is $4.95 \times 10(\hat{} - 19)$ joules. Calculate the critical frequency and the corresponding wavelength of the photon required to eject the electron.

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9. Calculate the wavelength of a body of mass 2 mg moving with a velocity of 10 m $\sec(-1)$

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10. Name an isotope of hydrogen.

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11. Write the electronic configuration of the elements having atomic number 27.

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12. What is the difference between two isotopes of an element ?

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13. Draw the atomic structure of an element containing 11 protons, 11 electrons and 12 neutrons ?

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14. Write the electronic configuration of the elements having atomic number 26.

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15. Which elements has electronic configuration $1s^2 2s^3 s^2 3p^6 4s^2$?

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16. Write the electronic configuration of the elements having atomic number 24.

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17. The atom of which element has no neutron in its nucleus ?

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18. Which atom has the electronic configuration $1s^2 2s^2 2p^3$?

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19. Write the electronic configuration of the elements having atomic number 25.

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20. Name three fundamental particles which make an atom.

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21. What is the maximum number of electrons that can remain in a d-subshell ?

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22. An atom of an element has its K and L shells completely filled with electrons. What is its atomic number ?

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23. What is the shape of the 'p' orbital ?

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24. Give the electronic configuration of the element.

having atomic number 24.

having atomic number 29.

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25. Which quantum number specifies the shape of an orbital in an atom ?

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26. Name the atoms indicated by the following configuration.

$1s^2 2s^2 p^2$

$1s^2 2s^2 p^6 3s^1$

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27. Which rule explains the three unpaired electrons present in nitrogen atom ?

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28. How many number of electrons and neutrons are present in tritium ?

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29. From amongst the following electronic configuration, find out the alkaline earth element.

$[Ar]4s^2$

$[Ar]3d^5 4s^2$

$[Ar]3d^{10} 4s^2$

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30. Give electronic configuration of chlorine atom.

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31. Name three fundamental particles which make an atom.

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32. The atom of which element has no neutron in its nucleus ?

Watch Video Solution

33. What is the shape of the 'p' orbital ?

Watch Video Solution

34. Write the electronic configuration of the atom having atomic number 29 ?

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35. State Pauli's exclusive principle.

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36. What is the electronic configuration of the element of atomic number 22. To which group of the periodic table does it belong ?

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37. State Aufbau's principle.

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38. If the principal quantum number n has a value of 3, what are the permitted values of other quantum numbers ?

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39. State Pauli's exclusive principle.

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40. What is the difference between two isotopes of an element ? Give one example.

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41. Write a short note on Bohr's atomic model ?

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42. What is uncertainty principle ?

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43. State Hund's rule of maximum multiplicity.

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44. Why three p-orbitals of each of the two atoms cannot form more than one sigma bond ?

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45. Which quantum number has different values for the two electrons of helium atom ?

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46. State the number of neutrons and protons present in C^{12} and C^{14}.

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47. Justify the position of carbon and lead in the periodic table on the basis of electronic configuration.

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48. The electronic configuration of an atom is $1s^2 2s^2 2p^6 3s^2$. Determine its atomic number. How many neutrons are present in the nucleus if its atomic weight is 24.

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49. An atom has its K and L shells completely filled and six electrons in the M shell. How many p-electron are there in the atom ?

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50. Give the quantum numbers of the electron present in hydrogen atom.

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51. Why three p-orbitals of each of the two atoms can't form more than one sigma bond ?

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52. Name an element, the atom of which contains maximum number of unpaired electrons in the d orbital.

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53. State the number of neutrons and protons present in C^{12} and C^{14}.

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54. An atom has its K and L shells completely filled and seven electrons in the M-shell. Find out the total number of p-electron in an atom ?

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55. State and briefly explain Aufbau's principle.

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56. Write the electronic configuration of an element atomic number 25 ?

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57. Give the value of n and l for each of the subshell:

2p

4s

4d

4f

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58. Describe the essential postulates of Bohr's theory of atom. How does Bohr's theory differ from that of Rutherford ?

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59. Write a note on Pauli's exclusion principle

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60. State Hund's rule.

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61. Derive de-Broglie's equation and state its significance.

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62. Give an account of Rutherford's model of the atom. How did Bohr prove upon Rutherford's nuclear model of the atom.

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63. What are quantum numbers ? Describe briefly four quantum numbers ?

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64. Give an account of Rutherford's model of the atom. How did Bohr prove upon Rutherford's nuclear model of the atom.

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65. What are quantum numbers ? Describe briefly four quantum numbers ?

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66. Which is more stable configuration and why ? `4s^2 3d^9 and 4S^1 4s^10

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67. What is the order of increasing bond angle of the following ? What is the theory involved ? H_2O, NH_3, CH_4

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68. The atomic orbitals are progressively filled in order of increasing energy. This principle is called:

A. Hund's rule

B. Aufbau principle

C. Exclusion principle

D. de-Broglie rule

Answer: B

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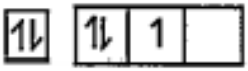
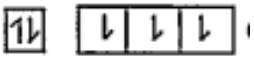
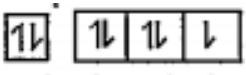
69. The orbital diagram in which both Pauli's exclusion principle and Hund's rule are violated is:

A. 

B. 

C. 

D. 

Answer: A

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

A. Hund

B. Thomson

C. Rutherford

D. Sommerfeld

Answer: D

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71. The following quantum numbers are possible for how many orbitals ?

$n=3, l=2, m=+2$

A. 3

B. 2

C. 1

D. 4

Answer: C

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72. The 19th electron of chromium has which of the following sets of quantum numbers ?

A. $n = 3, l = 0, m = 0, s = 1/2$

B. $n = 3, l = 2, m = -2, s = 1/2$

C. $n = 4, l = 0, m = 0, s = 1/2$

D. $n = 4, l = 1, m = -1, s = 1/2$

Answer: C

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73. Which of the following sets of quantum numbers is not possible ?

A. n=2, l=1, m=-1, s=-1/2

B. n=2, l=1, m=-1, s=+1/2

C. n=3, l=0, m=-2, s=+1/2

D. n=3, l=2, m=-3, s=+1/2

Answer: D

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74. Which one of the following pairs of ions have the same electronic configuration ?

A. Cr^{3+}, Fe^{3+}

B. Fe^{3+}, Co^{3+}

C. Fe^{3+}, Mn^{2+}

D. Sc^{3+}, Cr^{3+}

Answer: B

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75. In a hydrogen atom if the energy of an electron in the ground state is 13.6eV then that in the second excited state is:

A. -1.51 eV

B. -6.04 eV

C. -3.4 eV

D. -13.6 eV

Answer: A

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76. Which of the following ions has the maximum magnetic moment ?

A. Mn^{2+}

B. Ti^{2+}

C. Fe^{2+}

D. Cr^{2+}

Answer: A

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77. In hydrogen atom, energy of first excited state is -3.4 eV. Then find out the K.E. of the electron in the same orbit of hydrogen atom.

A. -1.51eV

B. -6.04eV

C. -3.4eV

D. -13.6eV

Answer: A

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78. The wavelength associated with a golf ball weighing 200g and moving at a speed of 5m/h is of the order

A. 10^{-10}m

B. 10^{-20}m

C. 10^{-36}m

D. 10^{-40}m

Answer: C

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79. The quantum numbers +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 and anticlockwise direction respectively.

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

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

Answer: D

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80. Identify the least stable among the following

A. Li^-

B. Be^-

C. B^-

D. C^-

Answer: B

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81. If the nitrogen atom had electronic configuration is $1s^7$, it would have energy lower than that of the normal ground state configuration $1s^2 2s^2 2p^3$ because the electrons

would be closer to the nucleus. Yet $1s^7$ is not observed. It violates:

A. Hund's rule

B. Heisenberg's uncertainty principle

C. Pauli's exclusion principle

D. Bohr postulate of stationary orbits

Answer: C

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82. List the quantum numbers (n and l) of electrons for 3d-orbital.

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83. Which quantum number specifies the shape of an orbital in an atom ?

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84. What is the value of e/m for an electron ?

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85. How many unpaired electrons are there in Ni^{2+} ion ?

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86. Differentiate between proton and photon.

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87. State Pauli's exclusive principle.

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88. What is the mass of proton in kilograms ?

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89. Write the electronic configuration of Cu^{2+} ion.

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90. Write the electronic configuration of the atom having atomic number 29 ?

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91. How many protons and neutrons are present in $15^{P^{31}}$?

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92. Write the electronic configuration of an element atomic number 24 ?

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93. Calculate the total charge in a mole of electron.

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94. Give the electronic configuration of an element of Gr IB of 4th period.

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95. Write the quantum number of an electron present in 3p-orbital.

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96. The atom of which element has no neutron in its nucleus ?

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97. Give electronic configuration of chlorine atom.

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98. Give the de Broglie equation.

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99. Write the electronic configuration of an element atomic number 29 ?

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100. Name the atoms indicated by the following configuration.

$1s^2 2s^2$ 2P_x^(1)`2P^1

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101. Name the atoms indicated by the following configuration.

$1s^2, 2s^2, 2p^6, 3s^1$

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102. Which rule explains the three unpaired electrons present in nitrogen atom ?

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103. What is the maximum number of electrons that can remain in a d^2 sub-shell ?

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104. An atom of an element has its K and L shells completely filled with electrons. What is its atomic number ?

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105. Write the electronic configuration of an element atomic number 24 ?

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106. Which atom has the electronic configuration $1s^2, 2s^2, p^2$?

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107. Write the electronic configuration of the elements having atomic number 25.

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108. Name three fundamental particles which make an atom.

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109. Give the electronic configuration of the element.

having atomic number 24.

having atomic number 29.

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110. Charge of one electron is___coulomb and___esu.

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111. Mass of one electron is_____gm.

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112. Mass of one proton is_____gm.

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113. Energy of an electron in nth orbit of Bohr's H-atom is given by the expression_____.

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114. Ionisation potential of H-atom is____ev per atom and____kJ/ mole.

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115. Radius of nth orbit of an atom with atomic number 'Z' is given by the relation_____.

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116. Charge of 1 gm of electron is____coulomb and___esu.

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117. Transition of electron in H-atom from N-shell to L-shell produces_____line in____series.

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118. Frequency associated with the photon of radiation having wavelength 5500

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119. Write the electronic configuration of Zn^{2+} ion ?

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120. State Hund's rule.

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121. Which is more stable configuration and why ? `4s^2 3d^9 and 4S^1 4s^10

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122. Write the electronic configuration of an element atomic number 25 ?

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123. Give the values of 'n' and 'l' for each of the subshell :

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124. Write the quantum number of an electron present in 3d-orbital.

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125. An atom has its K and L shells completely filled and seven electrons in the M-shell. Find out the total number of p-electron in an atom ?

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126. State and briefly explain Aufbau's principle.

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127. Calculate the energy of photon having frequency of $1.0 \times 10^{15} \sec^{-1}$

(Planck's of $1.0XX10^{15} \sec^{-1}$)

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128. Differentiate between orbit and orbital.

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129. State the number of neutrons and protons present in C^{12} and C^{14}.

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130. An atom has its K and L shells completely filled and five electrons in M shell. Find out the total number of p electrons in the atom ?

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131. Name an element, the atom of which contains maximum number of unpaired electrons in the d orbital.

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132. Give the quantum numbers of the electron present in hydrogen atom.

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133. An atom has its K and L shells completely filled and six electrons in the M shell. How many p-electron are there in the atom ?

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134. The electronic configuration of an atom is $1s^2 2s^2 2p^6 3s^2$. Determine its atomic number. How many neutrons are present in the nucleus if its atomic weight is 24.

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135. The wavelength of blue light is $4800\overset{\circ}{A}$, calculate the frequency and wave number of light.

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136. The frequency of the strong yellow line in the spectrum of sodium is $5.09 \times 10^{14}\,\mathrm{sec}^{-1}$. Calculate the wavelength of this light.

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137. State Hund's rule of maximum multiplicity.

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138. Give the shape of d-orbitals.

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139. Write the possible values of l and m for an electron in 3rd orbital.

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140. State Aufbau's principle.

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141. A neutral atom has 2k-electrons, 8l-electrons and 3m-electrons. Predict from this:

Its atomic number

Total number of s-electrons, total number of p-electrons and d-electrons.

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142. The observed electronic configuration of copper is not as per Aufbau principle. Explain.

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143. State Pauli's exclusive principle.

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144. How many protons and neutrons are present in the nuclei of C^{14} and N^{14} isotopes ?

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145. The electronic configuration of an atom is $1s^2 2s^2 2p^6 3s^2$. Determine its atomic number. How many neutrons are present in the nucleus if its atomic weight is 24.

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146. Which quantum number has different values for the two electrons of helium atom ?

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147. Mention the four quantum numbers of the last electron of sodium.

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148. What is the difference between two isotopes of an element ? Give one example.

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149. Calculate the number of electrons, protons and neutrons in the followings:

N^{-3}, S^{-2} and Na^{+}

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150. What is uncertainty principle ?

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151. Calculate the energy of the photon of wave-length 4500A. Given h= 6.6×10^{-34} J sec.

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152. Write the composition of the nucleus and the electronic configuration of C^{-12} isotope

of carbon ?

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153. Calculate the momentum of wave-length 0.33 nm.

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154. Calculate the energy of photon of radiations having v = frequency $5 \times 10^{14} s^{-1}$ (Planck's constant = $3.9 \times 10^{14} s^{-1}$)

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155. With what velocity must an electron travel so that its momentum is equal to that of a photon of wavelength $\lambda = 5200A$?

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156. Why is the electronic configuration, `1s^2, 2s^2, 2p_x^(2), 2p_y^(1), 2p_z^(0) is not correct for ground state of nitrogen ?

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157. Mass of neutron is.....times the mass of electron.

A. 1840

B. 1480

C. 2000

D. None

Answer: A

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158. The maximum number of unpaired electrons present in 4f-energy level is:

A. 5

B. 7

C. 10

D. 6

Answer: B

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159. Which is not deflected by magnetic field ?

A. Neutron

B. Positron

C. Proton

D. Electron

Answer: A

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160. In the atomic spectrum of hydrogen the series of lines observed in the visible region is:

A. Balmer series

B. Paschen series

C. Bracket series

D. Lyman series

Answer: A

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161. The maximum sum of the number of neutrons and protons in an isotope of hydrogen is:

A. 6

B. 5

C. 4

D. 3

Answer: D

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162. Which of the subshell has double dumb-bell shape ?

A. s

B. p

C. d

D. f

Answer: C

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163. Which one of the following pairs of atoms/atom-ions have identical ground state configuration ?

A. Li^+ and He^+

B. Cl^- and Ar

C. Na and k

D. F^+ and Ne

Answer: B

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164. The ratio of nucleons in O^{16} and O^{18} is:

A. $\frac{8}{9}$

B. $\frac{4}{5}$

C. $\frac{9}{8}$

D. 1

Answer: A

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165. The number of unpaired electrons in Mn^+ is:

A. 3

B. 5

C. 4

D. 6

Answer: D

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166. The (n+1) value for 4f-electron is:

A. 6

B. 4

C. 7

D. 8

Answer: C

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167. The ejection of electrons when the surface of metal is irradiated by light is called:

A. Zeeman effect

B. Stark effect

C. Photoelectric effect

D. Compton effect

Answer: C

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168. The n+l value for the 3-p energy level is:

A. 4

B. 7

C. 3

D. 1

Answer: A

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169. If uncertainty in position of electron is zero, the uncertainty in its momentum would be:

A. Zero

B. $\frac{h}{2}\pi$

C. $\frac{h}{4}\pi$

D. Infinity

Answer: D

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170. 1 fermi is equal to:

A. 10^{-13} cm

B. 10^{-10} cm

C. 10^{-4} cm

D. 10^{-8} cm

Answer: A

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171. Nucleus model of the atom was proposed by:

A. Thomson

B. Neil Bohr

C. Mosley

D. Rutherford

Answer: D

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172. Maximum number of electrons present in "N" shell is:

A. 18

B. 32

C. 2

D. 8

Answer: B

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173. The de Broglie wavelength associated with a material particle is:

A. Inversely proportional to momentum

B. Inversely proportional to its energy

C. Directly proportional to momentum

D. Directly proportional to its energy

Answer: A

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174. Compared to mass of lightest nucleus the mass of an electron is only:

A. $\frac{1}{80}$

B. $\frac{1}{360}$

C. $\frac{1}{1800}$

D. $\frac{1}{1000}$

Answer: C

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175. For azimuthal quantum number 1=3, the maximum number of electrons will be:

A. 2

B. 6

C. Zero

D. 14

Answer: D

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176. In an atom no two electrons can have the same value for all the quantum numbers. This was proposed by:

A. Hund

B. Pauli

C. Dalton

D. Avogadro

Answer: B

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177. Mass of an electron:

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178. The magnetic quantum number for valency electron of sodium is:

A. 3

B. 2

C. 1

D. Zero

Answer: D

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179. The Heisenberg's uncertainty principle can be applied to:

A. A cricket ball

B. A football

C. A jet aeroplane

D. An electron

Answer: D

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180. How many sets of four quantum number are possible for the electrons present in He^{2-}:

A. 4

B. 3

C. 2

D. None of these

Answer: A

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181. Maximum number of electrons which can be accommodated in a g subshell is:

A. 14

B. 18

C. 12

D. 20

Answer: B

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182. Assuming the velocity be same, which sub-atomic particle possesses smallest de Broglie wavelength:

A. An electron

B. A proton

C. An α-particle

D. All have same 'lambda`

Answer: C

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183. The phenomena of photoelectric effect was successfully explained by:

A. Bohr

B. Maxwell

C. Einstein

D. Planck

Answer: C

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184. According to Bohr's theory the radius of electron in an orbit described by principal quantum number n and atomic number Z is proportional to:

A. Z^2n^2

B. $\frac{Z^2}{n^2}$

C. $\frac{Z^2}{n}$

D. $\frac{n^2}{Z}$

Answer: D

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185. Angular momentum of an electron in an orbital is given by:

A. $n\frac{h}{2\pi}$

B. $\frac{h}{2\pi} \times \sqrt{l(l+1)}$

C. $n\frac{h}{2\pi}$

D. None

Answer: B

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186. The angular momentum of electron in nth orbit is given by:

A. nh

B. $\frac{h}{2\pi n}$

C. $n\frac{h}{2\pi}$

D. $n^2 \frac{h}{2\pi}$

Answer: C

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187. The energy of the electron is second Bohr's orbit in the hydrogen atom is -3.41 eV. The energy of the electron is second Bohr's orbit of He^+ ion would be:

A. -85eV

B. -13.62 eV

C. -1.70 eV

D. -6.82 eV

Answer: B

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188. The ratio of the energy of a photon of $2000\overset{\circ}{A}$ wavelength radiation to that of 4000 $\overset{\circ}{A}$radiation is:

A. 1/4

B. 1/2

C. 2

D. 4

Answer: C

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189. The velocity of electron in the hydrogen atom is $2.2 \times 10^6 \frac{m}{s}$. The de Broglie wavelength for this electron is:

A. 33 nm

B. 45.6 nm

C. 23.3 nm

D. 0.33 nm

Answer: D

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190. If the Planck's constant, $h = 6.6 \times 10^{-34}$ Js, the de Broglie's wavelength of a particle

having momentum of $3.3 \times 10^{-24} kgms(-1)$

will be:

A. 0.02 $\overset{\circ}{A}$

B. 0.5$\overset{\circ}{A}$

C. 2 $\overset{\circ}{A}$

D. 500$\overset{\circ}{A}$

Answer: C

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191. The amount of energy required to remove the electron from a Li^{2+} ion in its ground state is how many times greater than the amount of energy required to remove the electron from an H atom in its ground state:

A. 9

B. 2

C. 3

D. 5

Answer: A

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192. Binding energy of hydrogen atom is 13.6 eV. The binding energy of a singly ionised helium atom is:

A. 13.6 eV

B. 27.2 eV

C. 54.4 eV

D. 3.4 eV

Answer: C

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193. The wave number of radiation of wavelength 500 nm is:

A. $5 \times 10^{-7} m^{-1}$

B. $2 \times 10^{7} m^{-1}$

C. $2 \times 10^{6} m^{-1}$

D. $500 \times 10^{-9} m^{-1}$

Answer: C

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194. A hydrogen atom is in its ground state absorbs a photon. The maximum energy of such a photon is:

A. 1.5 eV

B. 3.4 eV

C. 10.2 eV

D. 13.6 eV

Answer: D

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195. The ratio of kinetic energy and potential energy of an electron in any orbit is equal to:

A. Zero

B. -1/2

C. -2

D. Infinity

Answer: B

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196. The de Broglie wavelength of a particle with mass 1 g and velocity 100 m/s is:

A. 6.63×10^{-33}m

B. 6.63×10^{-34}m

C. 6.63×10^{-35}m

D. 6.65×10^{-35}m

Answer: A

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197. Which is not permissible subshell ?

A. 2d

B. 4f

C. 6p

D. 3s

Answer: A

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198. Splitting of spectral lines when atoms are subjected to strong electric field is called :

A. Zeeman effect

B. Stark effect

C. Decay

D. Disintegration

Answer: B

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199. Alpha particle is....times heavier than neutron:

A. 2

B. 4

C. 3

D. 25

Answer: B

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200. Non-directional orbital is:

A. 3s

B. 4f

C. 4d

D. 4p

Answer: A

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201. The number of elliptical orbits, including circular orbits in the M shell of an atom is:

A. 3

B. 4

C. 2

D. 1

Answer: A

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

A. Heisenberg

B. Bohr

C. Planck

D. Einstein

Answer: B

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203. When 3d-orbital is complete, the newly entering electron goes into:

A. 4f

B. 4s

C. 4p

D. 4d

Answer: C

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204. The ion that is isoelectronic with CO is:

A. CN^-

B. O_2^+

C. O_2^-

D. N_2^+

Answer: A

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205. The last electron placed in the third(n=3) quantum shell for:

A. Kr

B. Zn

C. Cu

D. Ca

Answer: C

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206. The number of unpaired electrons present in Cr^{3+} is:

A. 3

B. 1

C. 2

D. 5

Answer: A

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207. Possible number of orientations of a subshell is:

A. l

B. n

C. 2l+1

D. n^2

Answer: C

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208. The correct set of quantum number for the unpaired electron of chlorine atom is:

A. $n=2, l=1, m=0$

B. $n=2, l=1, m=1$

C. $n=3, l=1, m=1$

D. $n=3, l=0, m=0$

Answer: C

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209. One electron volt is:

A. 1.6×10^{-19} erg

B. 1.6×10^{-12} erg

C. 1.6×10^{-8} erg

D. 1.6×10^{8} erg

Answer: B

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210. Which has minimum number of unpaired d-electrons ?

A. Fe^{3+}

B. Co^{3+}

C. Co^{2+}

D. $Mn(+2)$

Answer: C

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211. Which ion has the maximum magnetic moment ?

A. Mn^{3+}

B. Cu^{2+}

C. Fe^{+3}

D. V^{+3}

Answer: C

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212. What is the energy in joule of a photon of light with wavelength 4.0×10^3nm ?

A. 7.5×10^{-20}

B. 5.0×10^{-20}

C. 2.0×10^{-10}

D. 2.5×10^{-10}

Answer: B

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213. If the ionisation potential for hydrogen atom is 13.6 eV, then the wavelength of light required for the ionisation of hydrogen atom would be:

A. 1911 nm

B. 912 nm

C. 68 nm

D. 91.2 nm

Answer: D

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214. The maximum wavelength of light that can excite an electron from first to third orbit of hydrogen atom is:

A. 487 nm

B. 170 nm

C. 103 nm

D. 17 nm

Answer: C

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215. The work function for a metal is 4eV. To emit a photo electron of zero velocity from the surface of the metal, the wavelength of incident light should be:

A. $2700\overset{\circ}{A}$

B. $1700\ \overset{\circ}{A}$

C. $5900\ \overset{\circ}{A}$

D. $3100\overset{\circ}{A}$

Answer: D

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216. Ultraviolet light of 6.2 eV falls on aluminium surface (work function = 4.2 eV). The kinetic energy (in joule) of the fastest electron emitted is approximately:

A. 3×10^{-21}

B. 3×10^{-19}

C. 3×10^{-17}

D. 3×10^{-15}

Answer: B

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217. The series limit for Balmer series of H-spectra is.....

A. 3664

B. 3800

C. 4000

D. 4200

Answer: A

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218. The wavelength of radiation emitted when electron falls from 4th Bohr's orbit to 2nd in H atom is:

`R_H=1.09678xx10^(-7)m^(-1))

A. 972 nm

B. 486 nm

C. 243 nm

D. 182 nm

Answer: B

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219. The energy of the electron is first orbit of He^+ is (`R_H = -8712xx10^(-20) J). The energy of the electron in the first orbit of H is:

A. $-871.6 \times 10^{-20} J$

B. $-435.8 \times 10^{-20} J$

C. $-217.9 \times 10^{-20} J$

D. $-108.9 \times 10^{-20} J$

Answer: C

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220. $E_1 f$ or $He^+ is -54.4eV$. The E_2 for He^+ would be:

A. -6.8 eV

B. -13.6 eV

C. -27.2 eV

D. -108.8 eV

Answer: B

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221. The highest excited state that unexcited hydrogen atom can reach when they are bombarded with 12.2 eV electron is:

A. n=1

B. n=2

C. n=3

D. n=4

Answer: C

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222. An electron will have the highest energy in the set:

A. 3, 2, 1, 1/2

B. 4, 2, -1, 1/2

C. 4, 1, 0, -1/2

D. 5, 0, 0, 1/2

Answer: B

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223. The line spectrum observed when electron falls from the higher level into L level is known as :

A. Balmer series

B. Paschen series

C. Bracket series

D. None of these

Answer: A

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224. The total number of fundamental particles in one atom of $_{6}^{14}C$ is:

A. 6

B. 8

C. 14

D. 20

Answer: D

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225. Which orbital is spherically symmetrical ?

A. 5f

B. 4p

C. 3d

D. 3s

Answer: D

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226. Which transition metal cation has maximum unpaired electrons ?

A. Mn^{2+}

B. Ni^{2+}

C. Co^{2+}

D. Fe^{2+}

Answer: A

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227. The equation $\lambda = \frac{h}{\mu}$ was deduced by:

A. Heisenberg

B. de Broglie

C. Einstein

D. Planck

Answer: B

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228. The electronic transition from n=2 to n=1 will produce shortest wavelength in:

A. H atom

B. D atom

C. $He^{+}ion$

D. Li^{2+}

Answer: D

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229. Which has highest e/m ratio ?

A. He^{2+}

B. H^{+}

C. He^{+}

D. H

Answer: B

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230. Transition from n = 4, 5, 6 to n = 3 in hydrogen spectrum gives:

A. Lyman series

B. Paschen series

C. Balmer series

D. P-fund series

Answer: B

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231. The mass of a neutron is of the order of:

A. $10^{-23}kg$

B. `10^(-24) kg

C. $10^{-26}kg$

D. $10^{-27}kg$

Answer: D

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232. Electrons occupy the available sub-level which has lower n+l value. This is called:

A. Hund's rule

B. Aufbau principle

C. Heisenberg's uncertainty principle

D. Pauli's principle

Answer: B

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233. Which is not electromagnetic radiation ?

A. Infrared rays

B. X-rays

C. Cathode rays

D. $\gamma - rays$

Answer: C

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234. Which wave property is directly proportional to energy of electromagnetic radiation ?

A. Velocity

B. Frequency

C. Wave number

D. All of these

Answer: D

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235. The principle which gives a way to fill the electrons in the available energy level is:

A. Hund's rule

B. Pauli's exclusion principle

C. Aufbau principle

D. None of these

Answer: C

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236. The relation between energy of a radiation and its frequency was given by:

A. de Broglie

B. Elinsten

C. Planck

D. Bohr

Answer: C

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237. The angular momentum of electron of H atom is proportional to:

A. r^2

B. 1/r

C. $\sqrt{r}$

D. $\frac{1}{\sqrt{r}}$

Answer: C

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238. The frequency of first line of Balmer series in hydrogen atom is V_0. The frequency of corresponding line emitted by singly ionised helium atom is:

A. 2_{v_0}

B. 4_{v_0}

C. $\frac{V_0}{2}$

D. $\frac{V_0}{4}$

Answer: B

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239. Which are isoelectronic with each other ?

A. Na^+ and Ne

B. K^+ and O

C. Ne and O

D. Na^+ and K^+

Answer: A

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240. Size of the nucleus is:

A. 10^{-15} cm

B. 10^{-13} cm

C. 10^{-10} cm

D. 10^{-8} cm

Answer: B

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241. The orbital angular momentum of an electron in 2s-orbital is:

A. $\frac{h}{4}\pi$

B. Zero

C. $\frac{h}{2}\pi$

D. sqrt2.h/(2pi)

Answer: B

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242. The number of vacant orbitals of element with atomic number 14 is:

A. 2

B. 4

C. 8

D. 6

Answer: D

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

A. Mg^{2+}

B. Ti^{2+}

C. V^{2+}

D. Fe^{2+}

Answer: D

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244. For a 'd' electron, the orbital angular momentum is:

A. $\sqrt{(6)h}$

B. $\sqrt{(2)h}$

C. h

D. 2h

Answer: A

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245. The lightest particle is:

A. Electron

B. Proton

C. Neutron

D. β-particle

Answer: A

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246. Which consists of particle of matter ?

A. Alpha rays

B. Beta rays

C. Cathode rays

D. All of the above

Answer: D

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247. The energy of an electron in the first Bohr's orbit of H atom is -13.6 eV. The possible energy value (s) of the excited state (s) for electrons in Bohr's orbits of hydrogen is (are):

A. -3.4 eV

B. -4.2 eV

C. -6.8 eV

D. +6.8 eV

Answer: A

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248. For an electron if the uncertainty in velocity is Δv, the uncertainty in its position (Δx) is given by:

A. $\frac{h}{2}\pi m\Delta v$

B. $\frac{2\pi}{hm\Delta v}$

C. $\frac{h}{4\pi m\Delta v}$

D. $\frac{2\pi}{h\Delta v}$

Answer: C

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249. The quantum numbers for the last electron in an atom are n = 3, l = 1 and m = -1. The atom is:

A. Al

B. Si

C. Mg

D. C

Answer: A

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250. The radius of Bohr's first orbit in H atom is 0.053 nm. The radius of second orbit in He^+ would be:

A. 0.0265 nm

B. 0.0530 nm

C. 0.1060 nm

D. 0.2120 nm

Answer: C

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251. The ionization potential of hydrogen atom is 13.6 eV. The energy required to remove an electron from the n=2 state of hydrogen atom is:

A. 27.2 eV

B. 13.6 eV

C. 6.8 eV

D. 3.4 eV

Answer: D

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252. The number of nodal planes is greatest for the orbital:

A. 1s

B. 2p

C. 3d

D. 3p

Answer: C

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253. For which species, Bohr's theory does not apply:

A. H

B. Be

C. He^+

D. Li^{2+}

Answer: B

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254. Number of unpaired electrons in the electronic configuration `1s^2, 2s^2, 2p^4:

A. 2

B. 3

C. 4

D. 6

Answer: A

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255. Which represents the correct set of four quantum number of a 4d-electron:

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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256. The value of bohr's radius for hydrogen atom is:

A. $0.529 \times 10(-8)$ cm

B. $0.529 \times 10(-10)$ m

C. $0.529 \overset{\circ}{A}$

D. All of these

Answer: D

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257. The threshold wavelength for photoelectric effect on sodium is 5000 $\overset{\circ}{A}$. Its work function is:

A. 4×10^{-19} J

B. 1 J

C. $2 \times 10^{-19} J$

D. $3 \times 10^{-10} J$

Answer: A

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258. $\sqrt{2}.\ \frac{h}{2\pi}$

A. -6 V

B. -2.1 V

C. -3.9 V

D. -8.1 V

Answer: C

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259. The total energy of the electron in the hydrogen atom in the ground state is -13.6 eV. The KE of this electron is:

A. 13.6 eV

B. Zero

C. -13.6 eV

D. 6.8 eV

Answer: A

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260. If the series limit of wavelength of the Lyman series for the hydrogen atom is 912 $\overset{\circ}{A}$, then the series limit of wavelength for the Balmer series of the hydrogen atom is:

A. 912 $\overset{\circ}{A}$

B. $912 \times 2\overset{\circ}{A}$

C. $912 \times 4\overset{\circ}{A}$

D. $\frac{912}{2}\overset{\circ}{A}$

Answer: C

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261. The difference in angular momentum associated with the electron in two successive orbits of hydrogen atom is:

A. $\frac{h}{\pi}$

B. $\frac{h}{2\pi}$

C. $\frac{h}{2}$

D. $(n-1)\frac{h}{2\pi}$

Answer: B

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262. Ionisation potential of Hydrogen atom is 13.6 eV. Hydrogen atom in the ground state are excited by monochromatic light of energy 12.1 eV. The spectral lines emitted by hydrogen according to Bohr's theory will be:

A. One

B. Two

C. Three

D. Four

Answer: C

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263. The energy per quantum associated with light of wavelength $250 \times 10(- 19)$ meter is:

A. $8.95 \times 10(- 12)$erg

B. $7.95 \times 10(- 19)$erg

C. $8.95 \times 10(-19)$erg

D. None of these

Answer: B

264. The shortest λ for the Lyman series is....

(Given $R_H = 109678 cm^{-1}$):

A. 991$\overset{\circ}{A}$

B. 700 $\overset{\circ}{A}$

C. 600 $\overset{\circ}{A}$

D. 811 $\overset{\circ}{A}$

Answer: A

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265. The longest λ for the Lyman series is....

(Given $R_H = 109678 cm^{-1}$):

A. 1215

B. 1315

C. 1415

D. 1515

Answer: A

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266. The λ for H_alpha line of Balmer series is 6500 $\overset{\circ}{A}$. Thus λ for H_β line of Balmer series is:

A. 4814

B. 4914

C. 5014

D. 4714

Answer: A

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267. Mosley's name is connected with the discovery of:

A. Protons

B. Neutrons

C. Atomic number

D. Atomic weight

Answer: C

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268. The ratio of specific charge (e/m) of an electron to that of a hydrogen ion is:

A. 1:1

B. 1840:1

C. 1:1840

D. 2:1

Answer: B

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269. The mass of an electron is m, its charge e and it is accelerated from rest through a potential difference V. The Kinetic energy of the electron in joules will be:

A. V

B. eV

C. MeV

D. None

Answer: B

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270. In the above question, the velocity acquired by the electron will be:

A. $\sqrt{\frac{V}{m}}$

B. $\sqrt{\frac{eV}{m}}$

C. $\sqrt{\frac{2eV}{m}}$

D. None

Answer: C

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271. The e/m is not constant for:

A. Cathode rays

B. Positive rays

C. $\alpha - rays$

D. β-rays

Answer: B

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