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## CHEMISTRY

# BOOKS - KUMAR PRAKASHAN KENDRA CHEMISTRY (GUJRATI ENGLISH) 

## STRUCTURE OF ATOM

Section A Questions

1. Which were the major problems before the scientists after the discovery of sub atomic particles ?

## 2. Explain Dalton s atomic theory

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3. Explain discovery of electron.

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4. What is cathode rays discharge tube ? Write down
its uses.

D Watch Video Solution
5. What is cathode rays ? Write down the characteristics.

## D Watch Video Solution

6. Write down resutls of cathode ray discharge tubes.

## D Watch Video Solution

7. Who discovered the ratio of charge to mass of electon and how? Expalin with diagram
8. According to Thomson the direction cathode particle in electric discharge tube by electrical and magnetic . Field depends which factors?

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9. Who discovered charge of electron ? State charge mass of electron.

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10. Give general information about the fundamental particles of atom.

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11. Explain discovery of protons.

## - Watch Video Solution

12. What are canot rays ? Write characteristics.

## - Watch Video Solution

13. Sub Que : Who discovered proton?
14. Give names of atomic models and write about Thomson model.

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15. Explain the production characteristic and uses of $X$ rays.

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16. Write about rays emit by radioactive elements
17. Explain $\alpha \beta$ and $\gamma$ rays

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18. Explain Rutherford nuclear model of atom

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19. Write down observation and conclusions of $\alpha$ particle scattering experiment.

## 20. Explain Rutherford nuclear model of atom

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21. In Rutherford 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
22. In Rutherford experiment if light atoms used instead of heavy elements than what change is observed in results ?

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23. Which are the drawbacks of Rutherford atomic model

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24. Explain : Rutherford atomic model can not explain
stability of an atom

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25. What is atomic number nucleons and mass number
? Give relation between them.

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26. What is atomic number and number of electron in I
and II proton present in hydrogen and sodium atom respectively
27. How to mention the atom notation ? Give example

## D Watch Video Solution

28. Give defination and examples of isobars and isotopes.

## D Watch Video Solution

29. Give isotopes of hydrogen carbon and chlorine and write down number of electron neutron and protons.
30. Which development played a role in the formation of Bohr.s model of atom ?

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31. According to the electromagnetic theory of maxwell what happen when charge particles accelerated?

## D Watch Video Solution

32. What is electromagnetic radiation ?
33. What is light ?

## - Watch Video Solution

34. Explain properties of electromagnetic wave.

## - Watch Video Solution

35. Write electromagnetic spectrum.
36. The characteristics electromagnetic radiation given by which properties?

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37. Arrange the following type of radiation 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 .
38. Which observatin are not explain by electron magnetic theory of physics ?

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39. Explain phenomenon of black bod radiation .

- Watch Video Solution

40. Write importance of Planck's quantum theory.
41. Explain photoelectric effect.

## - Watch Video Solution

42. Explain : Photoelectric effect.

## - Watch Video Solution

43. Explain : energy photon energy of electron and no of photons in photoelectric effect.

- Watch Video Solution

44. Write down Dual behaviour of electromagnetic radiation.

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45. Explain emission and absorption spectrum

- Watch Video Solution

46. Explain line spectra and its uses.

D Watch Video Solution
47. What is hydrogen spectrum give its characteristic?

## D Watch Video Solution

48. Explain Balmer series and gives its equation.

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49. Write down of hydrogen spectrum .

- Watch Video Solution

50. Give Rydberg equation for all lines in hydrogen

## spectrum

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51. What is the difference in line spectrum of different atoms and hydrogen atom ?

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52. Write postulates of Bohr.s model of hydrogen atom

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53. Bohr.s atomic model.

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54. Write down Bbohr.s model of hydrogen atom.

## D Watch Video Solution

55. Explain according to Bohr.s model of hydrogen (1)
principal quantum number (ii) Reading of stationary orbit (r) (iii) Energy of stationary state (iv) isoelecronic ion of $h(v)$ Velocity of electron
56. Explain linear and angular momentum.

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57. Explain hydrogen spectrum by Bohr's model

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58. Write down limitations of bohrs model
59. Which two development remove the drawbacks of Bohr.s model ?

D Watch Video Solution
60. Write about Dual behavious of matter

## D Watch Video Solution

61. Write d-Broglies principle and explain .

D View Text Solution
62. Write down Helsenbergy uncertainty principle .

## - Watch Video Solution

63. Give reasons for the failure of the Bohr model

## - Watch Video Solution

64. Newton mechanics is applicable to which objects and not applicable to which objects ?

- View Text Solution

65. What is quantum mechanics ?give its primary information .

## D Watch Video Solution

66. Explain Schrodinger wave equation and also explain $\sigma$ and $\sigma^{2}$ one electron system.

## - Watch Video Solution

67. Explain Schrodinger wave equation and also explain
$\sigma$ and $\sigma^{2}$ one electron system.
68. Give difference between w and $w^{2}$

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69. What is quantum mechanical model of atom give
its important features.

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70. Write down principal quantum number ( n )
71. Write about subsidary quantum number (I)

## - Watch Video Solution

72. Write about magnetic quantum number ( $m_{1}$ )

## - Watch Video Solution

73. Write down about electron spin quantum number
(s)

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74. Given difference of 1 s and 2 s

## D Watch Video Solution

75. The largest and the shortest distance of the earth
from the sun are $r_{1}$ and $r_{2}$. Its distance from the sun when it is at pependicular to the major-axis of the orbit drawn from the sun is

## D Watch Video Solution

76. Write characteristic of $s$ orbitals .
77. What is orbital ? Explain point and boundary surface diagram of orbitals

## D Watch Video Solution

78. Write about p-orbitals.

## - Watch Video Solution

79. Explain 2 p orbitals
80. Explain d orbital .

## - Watch Video Solution

81. Write alown about energy of orbitals in hydrogen

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82. Give the order of energy of orbitals in multielectron atom
83. Hydrogen atom has only one electron, so mutual repulsion between electrons is absent. However, in multielectron atoms mutual repulsion between the electrons is significant. How does this affect the energy of an electron in the orbitals of the same principal quantum number in multielectron atoms ?

## D Watch Video Solution

84. Explain the energy of orbital and extent of shielding in same shell depends on shape of orbitals.
85. Explain ( $n+1$ ) rules for energy of orbital by example

## D Watch Video Solution

86. On the basis of which rule arrangement of electron take place in atom?

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87. Explain arrangement of orbital with increasing energy on the basis of $(\mathrm{n}+1)$ rule .
88. Arrange the $1 \mathrm{~s}, 2 \mathrm{~s}, 4 \mathrm{~s}, 3 \mathrm{p}, 4 \mathrm{p}$ and 3 d orbitals according to increasing order of energy .

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89. Explain Aufbau principle with example

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90. Explain Pauli exclusion principle by example .
91. Write down about the Hund .s rule .

## D Watch Video Solution

92. Explain Hund.s rule of maximum multiplicity .

## D Watch Video Solution

93. What is electron configuration of atom ? Explain its method by example.
94. Give orbital picture of following elements Na Mg Al ,Si P , S , CI , Ar , K , Ca

## D Watch Video Solution

95. What is core electrons and valence electron ?

## D Watch Video Solution

96. Write electron configuration of chromium and copper give reason of are $(z=24) \mathrm{Cu}(\mathrm{z}=10$ and $\mathrm{Cr}=$ $4 s^{1}$
97. Explain by giving resons of stability of completely filled and half filled subshell

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98. The quantum number of six electrons are given below,Arrange them in order of increasing energies. If any of these combination has have the same energy lists:
(1) $\mathrm{n}-4, \mathrm{I}=2, m_{1}=2 m_{1}=\frac{1}{2}$
(2) $\mathrm{n}=3, \mathrm{I}=2, m_{1}=1, m_{s}=\frac{1}{2}$
(3) $n=4, l=1, m_{1}==0 m_{s}=\frac{1}{2}$
(4) $n=3: l=2 m_{1}=-2 m_{s}=-\frac{1}{2}$
(5) $n=3, l=1, m_{1}=-1 m_{s}=\frac{1}{2}$
(6) $n=4, l=1, m_{1}=0 m_{s}=\frac{1}{2}$

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99. The bromine atom possesses 35 electrons it contains 6 electrons in $2 p$ orbitals 6 elecrons in $3 p$ orbital and 5 electron in $4 p$ orbitals which of these electron experience the lowest effective nuclear charge

## D Watch Video Solution

100. Give symbol of following species :
(I) Number of electron proton and neutron in 108 and 8 respectively.
(ii) ca (z=20) and nucleon = 40
(iii) Species of mass number 25 proton 12 magnesium and electron 10
(iv) Species of Bromine f in which ( $\mathrm{z}=35$ ) electron 36 and neutron 45 .

## D Watch Video Solution

101. The unpaired electrons in Al and sl are present in
$3 p$ orbital . Which electron will experience more
effective nuclear charge from the nucleus ?

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102. indicate the number of unpaired electrons in
(a) p , (b) Si, (c) $\mathrm{Cr}(\mathrm{d}) \mathrm{fe}$ and (e) kr .

## D Watch Video Solution

103. Caculate the number of protons neutrons and electrons in ${ }_{35}^{80} \mathrm{Br}$.

- Watch Video Solution

104. The number of electrons protons and neutrons in a species are equal to 18,16 and 16 respectively . Assigh the proper symbol to the species.

## D Watch Video Solution

105. How many neutrons and protons are there in the following nuclei .
$.{ }_{6}^{13} \mathrm{C}, .{ }_{8}^{16} \mathrm{O},{ }_{.12}^{24} \mathrm{Mg},{ }_{.}^{88} \mathrm{Sr}$

## D Watch Video Solution

106. Write the complete symbol for the atom with the given atomic number ( $z$ ) and atomic mass ( $A$ )
(i) $Z=17, A=35$ (ii) $Z=92, A=233$
(iii) $Z=4, A=9$

## D Watch Video Solution

107. Symbol ${ }_{.35}^{79} \mathrm{Br}$ and ${ }_{.35}^{79} \mathrm{Br}$ can be written whereas
symbols ${ }_{79}^{35} \mathrm{Br}$ and are not acceptable Answer Briefly .

## D Watch Video Solution

108. (i) Calculate the number of electrons which will together weigh one gram (ii) Calculate the mass and charge of one mole of electron.
109. (i) Calculate the total number of electron present in one mole of method
(ii) Find (a) the total number and (b) the total that mass of neutron $=1.675 \times 10^{27} \mathrm{~kg}$
(iii) Find (a) the total number and (b) the total mass of protons in 34 of $\mathrm{NH}_{3}$ at STP

Will the answer change if the temperature and pressure are changed ?

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110. if the diameter of atom is 0.15 nm calculate the number of carbon atom which can be placed side by side in a straight line across length of scale of length 20 cm long

## D Watch Video Solution

111. $2 \times 10^{8}$ atoms of carbon are arranged side by side
caculate the radius of carbon atom if the length of this arrangement is 2.4 cm .
112. in milikan 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 $-1.282 \times 10^{18} \mathrm{C}$ calculate the number of electron presenct on it.

## D Watch Video Solution

113. A certain particle carreis $2.5 \times 10^{16} \mathrm{C}$ of static electric charge .Caculate the number of electrons presenct in it.

## D Watch Video Solution

114. The diameter of zinc atom is 2.6 A .Calcuate (a)
radius of zinc atom in pma and (b) number of atoms present in a length of 1.6 cm if the zinc atoms are arranged side by side lengthwise.

## D Watch Video Solution

115. An elements with mass number 81 contains $31.7 \%$ more neutronsis compared to protons Assign the atomic symbol.
116. An elements with mass number 81 contains $31.7 \%$ more neutronsis compared to protons Assign the atomic symbol .

## - Watch Video Solution

117. An elements with mass number 81 contains $31.7 \%$
more neutronsis compared to protons Assign the atomic symbol .

D Watch Video Solution
118. The vividh Bharati station of All india Radio Delhi .

Broadcasts on a frequency of 1.368 kHz (kilo hertz)

Calculate the wavelength of the elctromagnetic radiation emitted by transmitter .Which part of the electromagnetic spectrum does it belong to ?

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119. The wavelength range of the visible spectrum extends from vloler ( 400 nm ) to red ( 750 nm ) Express these wavelength in frequency ( Hz )
120. Calculate (a) wavenumber and (b) frequecy of yellow radiation having wavelength 5800 A

## D Watch Video Solution

121. Calculate (a) wavenumber and (b) frequecy of yellow radiation having wavelength 5800 A

## D Watch Video Solution

122. Calculate the wavelength frequency and wave number of a light wave whose period is $2.0 \times 10^{10} \mathrm{~s}$
123. Calculate energy of one mole of photons of radiation whose frequency is $5 \times 10^{14} \mathrm{~Hz}$
$\left(\mathrm{h}=6.626 \times 10^{34} j\right)$

## D Watch Video Solution

124. A 100 wart bulb emits monochromatic light of wavelength 400 bn , Calculate the number of photons emitted per second by the bulb.
125. Electromagnetic radiation of wavelength 242 nm is just sufficient to ionise the sodium atom. .Calculate the ionisation energy of sodium in $\mathrm{Kj} \mathrm{mol}^{-1}$

## D Watch Video Solution

126. The threshold frequency $V_{0}$ for a metal is
$7.0 \times 10^{14} s^{-1}$ Calculation the kinetic energy of and electron emitted when radiation of frequency $v=1.0 \times 10^{15} s^{-1}$ hits the metal.

## D Watch Video Solution

127. Find energy of each of the photon which
( ) Correspond to light of frequency $3 \times 10^{15} \mathrm{~Hz}$
(ii) have wavelength of 0.50 A

## D Watch Video Solution

128. What, is the number of photons of ligth with a wavelength of 400 pm that provide 1 j of energy

## D Watch Video Solution

129. Photon of wavelength $4 \times 10^{7}$ strikes on metal surface the work function of the metal being 2.13 eV

Calculate (i) The energy of the photon ev (ii) The kinetic energy of the emission and (iii) the velocity of the photoelectron .

$$
\left(1 \mathrm{eV}=1.6020 \times 10^{19} \mathrm{~J}\right)
$$

## D Watch Video Solution

130. Electromagnetic radiation of wavelength 242 nm is just sufficient to ionise the sodium atom .Calculate the ionisation energy of sodium in $\mathrm{Kj}_{\mathrm{mol}}{ }^{-1}$
131. A 25 watt bulb emits monochromatic yellow light of wavelength of $0.57 \mu m$. Calculate the rate of emission of quanta per second.

## - Watch Video Solution

132. Electrons are emitted with zero velocity from a metal surface when it is exposed to radiation of wavelength 6800A. Calculate threshold frequency $\left(V_{0}\right)$ and work function $\left(W_{0}\right)$ of the metal.
133. Nitrogen laser produces a radiation at a wavelength of 337.1 nm if the number of photons emitted is $5.6 \times 10^{24}$ calculate the power of this laser.

## D Watch Video Solution

134. Neon gas is generally used in the sign boards .if it emits strongly at 616 nm calculate (a) the frequency of emission (b) distance traveled by this radiation in 30 s
(c ) energy of quantum and (d) number of quanta present if it produces 2 J of energy .

## - Watch Video Solution

135. A 100 wart bulb emits monochromatic light of wavelength 400 bn , Calculate the number of photons emitted per second by the bulb.

## - Watch Video Solution

136. Lifetimes 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 emitted during the pulse source is $2.5 \times 10^{15}$.Calculate the energy of the source.
137. The longest wavelength double absorption transition is observed at 589 and 589 nm Calculate the frequency of each transition and energy difference between two excited states.

## - Watch Video Solution

138. Photon of wavelength $4 \times 10^{7}$ strikes on metal surface the work function of the metal being 2.13 eV

Calculate (i) The energy of the photon ev (ii) The kinetic energy of the emission and (iii) the velocity of the photoelectron .

$$
\left(1 \mathrm{eV}=1.6020 \times 10^{19} \mathrm{~J}\right)
$$

139. Following results are observed when sodium metal is irradiated with different wavelength Calculate
(a) threshold wavelength and (b) plank $s$ constant


## D Watch Video Solution

140. The ejection of the photoelectron from the silver metal in the photoelectric effect experiment can be stopped by applying the voltage of 0.35 eV with the
radiation 256.7 nm is used .Calculated the work function silver metal.

## - Watch Video Solution

141. If the photon of the wavlength 150 pm strikes an atom and one of tis inner bound electron is ejectred out with a velocity of $1.5 \times 10^{7} \mathrm{~ms}^{-7}$ calculate the energy with which it is bound to the nucleus .

- Watch Video Solution

142. What are the frequency and wavelength of a photon emitted during a transition from $\mathrm{n}=5$ state to
the $\mathrm{n}=2$ state in the hydrogen atom ?

## D Watch Video Solution

143. Caculate the energy associated with the first orbit of $\mathrm{He}^{+}$. What is the radius of this orbit ?

## D Watch Video Solution

144. What are the frequency and wavelength of a photon emitted during a transition from $\mathrm{n}=5$ state to the $\mathrm{n}=2$ state in the hydrogen atom ?
145. Calculate the ionisation energy of hydrogen atom as well as energy needed to promote its electron from first energy level to third energy level

## - Watch Video Solution

146. What is the maximum number of emission lines when the excited electron of a H atom in $\mathrm{n}=16$ drops to the ground state ?

- Watch Video Solution

147. (i) The energy associated with the first orbit in the hydrogen atom is $-2.18 \times 10^{18} \mathrm{Ja} \rightarrow m^{-1}$ what is the energy associated with the fifth orbit ?
(ii) Calculate the radius of Bohr. fifth orbit for hydrogen atom

## - Watch Video Solution

148. Calculate the wave number for the longest wavelength transition in the Balmer series of atomic hydrogen

## - Watch Video Solution

149. What is the energy in joules requried 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 $2.18 \times 10^{1}$ ergs

## D Watch Video Solution

150. The electron energy in hydrogen atom is given by
$E_{n}=\left(-2,18 \times 10^{18}\right) / m^{2} n^{2} J$ Calculate the energy
required to remove an electron completely from the
$\mathrm{n}=2$ orbit. What is the longest wavelength of ligth in
cm that can be used to cause this transition?

## D Watch Video Solution

151. (i) The energy associated with the first orbit in the hydrogen atom is $-2.18 \times 10^{18} \mathrm{Ja} \rightarrow m^{-1}$ what is the energy associated with the fifth orbit ?
(ii) Calculate the radius of Bohr. fifth orbit for hydrogen atom

## D Watch Video Solution

152. Calculate the energy required for the process

$$
H e_{g}^{+} \rightarrow H e_{g}^{2+}+e^{-}
$$

the ionization energy for the H atom in the ground state is $2.18 \times 10^{-18} \mathrm{Ja} \rightarrow \mathrm{m}^{-1}$

## D Watch Video Solution

153. Emission transition in the paschen series end at orbit $\mathrm{n}=3$ and start from orbit n and can be represented as $\mathrm{v}=3.29 \times 10^{15}(H z) \frac{1}{3^{2}-\frac{1}{n^{2}}}$

Calculate the vallue of $n$ if the transition is observed at
1285 nm . find the region of the spectrum

## D Watch Video Solution

154. Calculate the wave number for the longest wavelength transition in the Balmer series of atomic hydrogen

## D Watch Video Solution

155. What will be the wavelength of a ball of mass 0.1 kg moving with a velocity of $10 \mathrm{~ms}^{-1}$

## D Watch Video Solution

156. The mass of an electron is $9.1 \times 10^{31} \mathrm{~kg}$ if its K.E. Is
$3.0 \times 10^{25} \mathrm{~J}$ calculate its wavelength .

## - Watch Video Solution

157. Calculate the mass of a photon with wave length $(\lambda)=3.6 A$

## D Watch Video Solution

158. Dual behaviour of matter proposed by de Broglie
led to the discovery of electron microscope often used for the highly magnified images of biological moleculas and other type of material .If the velocity of the electron in this microsocope is $1.6 \times 10^{6} \mathrm{~ms}^{-1}$

Calculate de - Broglie wavelength associated with this
electron $\left(m_{e}=9.1 \times 10^{31} \mathrm{kgh}=6.626 \times 10^{34} \mathrm{Js}\right)$

## D Watch Video Solution

159. Dual behaviour of matter proposed by de Broglie
led to the discovery of electron microscope often used
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Calculate de - Broglie wavelength associated with this electron $\left(m_{e}=9.1 \times 10^{31} \mathrm{kgh}=6.626 \times 10^{34} \mathrm{Js}\right)$

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Calculate de - Broglie wavelength associated with this
electron $\left(m_{e}=9.1 \times 10^{31} \mathrm{kgh}=6.626 \times 10^{34} \mathrm{Js}\right)$

## D Watch Video Solution

161. The velocity associated with a proton moving in a potential difference of 100 v is $4.37 \times 10^{5} \mathrm{~ms}^{-1}$.if the hockey ball of mass 0.1 kg is moving with this velocity, calculate the wavelength associated with this velocity

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162. Mass of elements $9.1 \times 10^{31} \mathrm{~kg}$ find total uncertainty $(\Delta V . \Delta x)$ discuss the result ?

$$
\left(\mathrm{n}=6.626 \times 10^{34} J s\right)
$$

## D Watch Video Solution

163. Mass of elements $9.1 \times 10^{-31} \mathrm{~kg}$ find total uncertainty $(\Delta V . \Delta x)$
$\left(\mathrm{h}=6.626 \times 10^{-34} \mathrm{Js}\right)$

- Watch Video Solution

164. A microscope using suitable photons is employed
to locate an electron in an atom within a distance of 0.1 A .what is the uncertainty involved in the measurement of its velocity .

## - Watch Video Solution

165. A golf gall has a mass of 40 g and a speed of 45
$m / s$ if the speed can be measured within accuracy of
$2 \%$ calculate the uncertainty in the position
166. If the position of the electron is measured within an accuracy of +0.002 nm calculate the uncertainty in the momentum of the electron Suppose the momentum of the electron is $h / 4 \pi_{m} \times 0.05 \mathrm{~nm}$ is there any problem in defining this value ?

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

## D Watch Video Solution

168. The mass of an electron is $9.1 \times 10^{31} \mathrm{~kg}$ if its K.E. Is $3.0 \times 10^{25} \mathrm{~J}$ calculate its wavelength .

## D Watch Video Solution

169. Show that the circumference fo the Bohr orbit for
the hydrogen atom is an integral multiple of the de-
Broglie wavelength associated with the electron revolving around the orbit.
170. What is the total number of orbitals associated with the principle quantum number $n-3$ ?

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171. Using $\mathrm{s}, \mathrm{p}, \mathrm{d} \mathrm{f}$ notations describe the orbital with the following quantum number
$(a) n=2, l=1(b) n=4, l=0$
(c) $n=5, l=3$ (d) $n=3, l=2$

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172. (a) How many sub - shells are associated with $\mathrm{m}=4$
(b ) How many electron will be present in the sub shells having $m$ value of $\frac{1}{2}$ for $n=4$ ?

## D Watch Video Solution

## Section A Try Your Self 1

1. Find neutron electron and proton in the following
(i) ${ }_{15}^{31} \mathrm{P}$
(ili) ${ }_{11}^{29} \mathrm{Na}^{+}$
(iii) ${ }_{14}^{32} 5^{2-}$
(iv) ${ }_{101}^{235} \mathrm{X}$
(v) ${ }_{20}^{40} \mathrm{Ca}^{24}$
(vi) ${ }_{4}^{19} \mathrm{~F}$
2. Give symbol of following species :
(I) Number of electron proton and neutron in 108 and 8 respectively.
(ii) ca (z=20) and nucleon = 40
(iii) Species of mass number 25 proton 12 magnesium and electron 10
(iv) Species of Bromine $f$ in which ( $\mathrm{z}=35$ ) electron 36 and neutron 45 .

## D Watch Video Solution

3. Give relation between following pair of species
(i) ${ }_{20}^{40} \mathrm{Ca}$ and ${ }_{19}^{40} \mathrm{~K} \quad$ (iii) ${ }_{19}^{40} \mathrm{Ar}$ and ${ }_{20}^{40} \mathrm{Cu}$ and ${ }_{19}^{40} \mathrm{~K}$
(ii) ${ }_{17}^{35} \mathrm{Cl}$ and ${ }_{17}^{37} \mathrm{Cl}$
(iv) ${ }_{38}^{87} \mathrm{Sr}$ and ${ }_{3 \mathrm{~B}}^{90} \mathrm{Sr}$
4. Write number of nucleons of the following
(i) ${ }_{17}^{35} C I(i i) \cdot{ }_{19}^{40} K$

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## Section A Try Your Self 2

1. Calculate the number of electron in one mole $N^{-3}$ ion.
2. Find total number of electron proton and neutron in $0.192 \mathrm{~kg} \cdot{ }_{16}^{32} S$

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3. Calculate electron proton and neutron in $C I_{2} \mathrm{Cl}$ and
$C I^{-}$(for: $\mathrm{Z}=17$ and $\mathrm{A}=35$ )

D Watch Video Solution
4. Calculate the mass of 1 mole of neutron in kg

$$
\left(n_{m}=1.675 \times 10^{27} \mathrm{~kg}\right)
$$

5. Give symbol of atom name atomic number ( $Z$ ) . Mass number (A ) and their electron (e ) proton (p ) and neutron ( n ) of 1 to 20 atomic number containing elements .

## - Watch Video Solution

## Section A Try Your Self 3

1. Calculate frequency and wave number of 3.6 A wavelength of photon.
2. Calculate frequency and wave number of 3.6 A wavelength of photon.

## D Watch Video Solution

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

## - Watch Video Solution

4. Find the wavelength of electromagnetic radiation having frequency 1368 KHz .
5. Chlorophy in green plant absorb the light 4.620 $\times 10^{14} \mathrm{~Hz}$ then find the length of thed line and also state the region in spectra.

## D Watch Video Solution

6. Find the wavelength of electromagnetic radiation having frequency 1368 KHz .

## D Watch Video Solution

7. Find the wavelength of electromagnetic radiation having frequency 1368 KHz.

## (D) Watch Video Solution

## Section A Try Your Self 4

1. 1 mole photon having frequency $4.0 \times 10^{14} \mathrm{~Hz}$ find energy
2. Find the ratio of energy for radiations heaving 6000a and 4000 A wavelength
$\left(h=6.62 \times 10^{-34} J s, C=3 \times 10^{8} \mathrm{~ms}^{-1}\right)$

## - Watch Video Solution

3. 1 mole photon having frequency $4.0 \times 10^{14} \mathrm{~Hz}$ find energy

## D Watch Video Solution

4. Find the ratio of energy for radiations heaving 6000a and 4000 A wavelength

$$
\left(h=6.62 \times 10^{-34} J s, C=3 \times 10^{8} \mathrm{~ms}^{-1}\right)
$$

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5. The periodic time of radiation is $4 \times 10^{-10} s$ find wavelength wave number and frequency

## D Watch Video Solution

6. The photon having 6000a wavelength has energy E.

If the energy of photon 2 E find the wavelength of photon.
7. 1 mole photon having frequency $4.0 \times 10^{14} \mathrm{~Hz}$ find energy

## D Watch Video Solution

8. Find the frequency and wavelength of light require ionization of solution .
(ionization energy of solution $=8.2 \times 10^{-19} \mathrm{~J}$ )

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Section A Try Your Self 5

1. In this spectrum of $L i^{2+}$ the difference of two energy level is 2 and sum is 4 . Find the wavelength of photon for difference of these two energy state.
(note $n_{1}+n_{2}=4$ and $n_{2}=2$ so take $n_{1}=1$ and $n_{2}=3$

## - Watch Video Solution

2. In electron ..... From infinite state to ground state in

H atom . Find the emitted wavelength .

## D Watch Video Solution

3. In this spectrum of $L i^{2+}$ the difference of two energy level is 2 and sum is 4 . Find the wavelength of photon for difference of these two energy state.
(note $n_{1}+n_{2}=4$ and $n_{2}=2$ so take $n_{1}=1$ and $n_{2}=3$

## - Watch Video Solution

4. find the wave number of shortest wavelength In Balmer series (Note $n_{1}:=2 n_{2}=\propto$ )
5. In this spectrum of $L i^{2+}$ the difference of two energy level is 2 and sum is 4 . Find the wavelength of photon for difference of these two energy state.
(note $n_{1}+n_{2}=4$ and $n_{2}=2$ so take $n_{1}=1$ and $n_{2}=3$

## - Watch Video Solution

6. In this spectrum of $L i^{2+}$ the difference of two
energy level is 2 and sum is 4 . Find the wavelength of photon for difference of these two energy state.
(note $n_{1}+n_{2}=4$ and $n_{2}=2$ so take $n_{1}=1$ and $n_{2}=3$
7. Calculate the energy required for the process
$H e_{g}^{e} \rightarrow \mathrm{He}_{g}^{2+}+e^{-}$
the ionization energy for the H atom in the ground state is $2.18 \times 10^{18} \mathrm{Ja} \rightarrow \mathrm{m}^{-1}$

## D Watch Video Solution

8. Find the radius of first second third orbit of hydrogen

D Watch Video Solution
9. Calculate the ionization energy of $\mathrm{H}_{i} \mathrm{He}^{+}$and $\mathrm{Li}^{2+}$
in $\mathrm{kJmol}^{-1}$
Note $\mathbf{n}=\mathbf{1 , Z}=1,2,3$ respectively $E_{n}=\frac{2.18 \times 10^{-18} Z^{2}}{n^{2}}$

## D Watch Video Solution

10. The energy difference of two stable orbit of hydrogen is $214.68 \mathrm{kJmol}^{-1}$ if the transition of electron take place than find the emitted frequency
(Note: v= $\Delta E / h$ )

## Watch Video Solution

11. (i) The energy associated with the first orbit in the hydrogen atom is $-2.18 \times 10^{18} \mathrm{Ja} \rightarrow m^{-1}$ what is the energy associated with the fifth orbit ?
(ii) Calculate the radius of Bohr. fifth orbit for hydrogen atom

## - Watch Video Solution

12. Calculate the ratio of radius of $2 n$ and 3 rd orbit of hydrogen atom (Note $r_{n} \propto n^{2}$ )
13. (i) What is the energy of electron for hydrogen in J
/ atom and 1 / mole ?
(ii) Calculate the energy of this electron per mole for first transition.

## - Watch Video Solution

14. Calculate wavelength of emitted radiation when
electron transition from $n=3$ to $n=2$ ?
This radiation belong to which region.
15. The wavelength of first line of Balmer series is 656
nm . Calculate the wave length of second line of this
series. (Note : first line means $n_{3}$ to $n_{2}$ and second line means $n_{4} \rightarrow n_{2}$

## D Watch Video Solution

16. The energy of $n^{\text {th }}$ orbit of hydrogen is
$E_{n}=\frac{\left(1.31 \times 10^{6}\right)}{n} \mathrm{Jmol}^{-1}$ is electron transist from
$n=3$ to $\mathbf{n}=\mathbf{2}$ than find frequency of emitted radiation
$\left(\right.$ Note $\left.: \mathrm{h}=6.6 \times 10^{-34} j s N_{A}=6.02 \times 10^{23} \mathrm{~mol}^{-1}\right)$
17. The moving bullet of gun has 10 gm mass and $10^{-5}$ $m$ uncertainty in position. Find uncertainty in velocity

## D Watch Video Solution

2. The uncertainty in position is $10^{-10} \mathrm{~m}$ and in
velocity is $5.27 \times 10^{-24} \mathrm{~ms}^{-1}$ calculate mass of particle.

D Watch Video Solution
3. Nomination of electron is 5200 A At which velocity of electron its wavelength is equal to photon.

## D Watch Video Solution

4. the kinetic energy of proton wave is 500 eV
.Calculate debroglie wave length (mass of proton

$$
=1.67 \times 10^{-27} \mathrm{~kg}
$$

## D Watch Video Solution

5. The velocity of electron is $1 \%$ of velocity of light.

Calculate debrobile wavelength of electron.

## - Watch Video Solution

6. The kinetic energy of electron is $4.55 \times 10^{-25} J$ and mas is $9.1 \times 10^{-31} \mathrm{~kg}$ then calculate velocity momentum and wave length of electron.

## D Watch Video Solution

7. If electron is accelerated by $1.0 \times 10^{4}$ volt than calculate kinetic energy frequency and wavelength

D Watch Video Solution
8. The electron energy in hydrogen atom is given by
$E_{n}=\left(-2,18 \times 10^{18}\right) / m^{2} n^{2} J$ Calculate the energy
required to remove an electron completely from the $\mathrm{n}=2$ orbit. What is the longest wavelength of ligth in cm that can be used to cause this transition ?

## Watch Video Solution

9. (i) What is the energy of electron for hydrogen in J/
atom and 1 / mole ?
(ii) Calculate the energy of this electron per mole for first transition.
10. Calculate the nomination of particle which has $1 A$ wave

## D Watch Video Solution

11. Find the mass of photon of sodium lamp. How much times this mass than electron mass ?

## D Watch Video Solution

12. If the wavelength and distance travel by electron in

1 sec. Is same than calculate the its velocity .
13. The mass of an electron is $9.1 \times 10^{31} \mathrm{~kg}$ if its K.E. Is
$3.0 \times 10^{25} \mathrm{~J}$ calculate its wavelength .

## - Watch Video Solution

14. An electron and a proton are detected in a cosmic
ray experiment, the first with kinetic energy 10 keV
and the second with 100 keV.Which is faster, the
electron or the proton ? Obtain the ratio of their speeds. (electron mass $=9.11 \times 10^{-31} \mathbf{~ k g}$, proton mass $\left.=1.67 \times 10^{-27} \mathrm{~kg}, 1 \mathrm{eV}=1.60 \times 10^{-19} \mathrm{~J}\right)$
15. The uncertainty in position is $10^{-10} \mathrm{~m}$ and in velocity is $5.27 \times 10^{-24} \mathrm{~ms}^{-1}$ calculate mass of particle.

D Watch Video Solution
16. The moving bullet of gun has 10 gm mass and $10^{-5}$ $m$ uncertainty in position. Find uncertainty in velocity
17. Nomination of electron is 5200 A At which velocity of electron its wavelength is equal to photon.

## D Watch Video Solution

18. A golf gall has a mass of 40 g and a speed of 45
$m / s$ if the speed can be measured within accuracy of
$2 \%$ calculate the uncertainty in the position

D Watch Video Solution

Section B Objective Question

## 1. How the atom word is derived ?

- Watch Video Solution

2. What is point dipole?

- Watch Video Solution


## 3. What is cathode ray ?

## D Watch Video Solution

4. What is the charge mass its ratio electron ?
5. Who discovered $e / m$ for electron ? And how?

- Watch Video Solution

6. Who discovered proton and neutron ?

- Watch Video Solution

7. How the neutrons discovered by Chadwik?

- Watch Video Solution


## 8. State the characteristic and uses of X-rays

- Watch Video Solution

9. What is the name of Thomson model ?

- Watch Video Solution

10. Who studied the redioactivity?

- Watch Video Solution


## 11. Studied the radioactivity and developed it

${ }_{6}{ }_{6}^{14} C .{ }_{6}^{13} C \cdot{ }_{7}^{14} N \cdot{ }_{6}^{12} C$

- Watch Video Solution

12. Give the amount of protium and deuterium in hydrogen atom with symbol .

## D Watch Video Solution

13. Static isotopes of Hydrogen and write the no of proton Electron Neutron in them .
14. What is the atomic number of carbone? Give the symbol of its isotops

D Watch Video Solution
15. What are ${ }_{17}^{35} \mathrm{Cl}$ and ${ }_{17}^{37} \mathrm{Cl}$ ? Why

- Watch Video Solution

16. Deuterium Tritium are the Isotopes of -
17. What is scattering ? By which property electromagetic radiation it can be explain ?

## D Watch Video Solution

18. What is interference?

D Watch Video Solution
19. Which properties can be explained by wave nature and particle nature of light.
20. In visible spectrum which colour has maximum energy ? Static its wavelength and frequency.

## D Watch Video Solution

21. In visible spectrum which colour has minimum energy ?State ite wavelength and frequency.

## D Watch Video Solution

22. Give formula for coloumbic attraction force and graviation force ?

## 23. State Maxwell's electromagnetic principal.

## - Watch Video Solution

24. give the name of different parts of the electromagnatic spectrum.

## D Watch Video Solution

25. The characteristics electromagnetic radiation given
by which properties?

- Watch Video Solution

26. What is speed of electromagnetic radiation in vacuum ? What is it called?

## - Watch Video Solution

27. Give equation of wave number and periodic time

D Watch Video Solution
28. Is there nutron in nucleus of hydrogen?

D Watch Video Solution

# 29. What is the change observe in iron on heating with 

## different temperature?

## D Watch Video Solution

30. What is black substance ?

D Watch Video Solution
31. Calculate the ratio of diameter of atom and nucleus

- Watch Video Solution

32. in chlorine ${ }^{35} C I$ and. ${ }^{37} C I$ is in 3:1 ratio calculate charge atomic mass.

## D Watch Video Solution

33. Which of the following is dimensional formula of intensity of radiation?

## D Watch Video Solution

34. Explain visible spectrum and continuous spectrum.

- Watch Video Solution

35. Give example of continuous spectrum

- Watch Video Solution

36. Give the reason for the formation of spectrum .

- Watch Video Solution

37. Which colour from violet and Red is more refracted
? Why

- Watch Video Solution

38. What is emission spectrum ?

## D Watch Video Solution

39. State the uses of line spectrum or atomic spectra.

## D Watch Video Solution

40. Given below are some famous numbers associated
with electromagnetic radiations in different contexts
in physics. State the part of the electromagnetic
spectrum to which each belongs.
14.4 keV [energy of a particular transition in ${ }^{57} \mathrm{Fe}$
nucleus associated with a famous high resolution spectroscopic method (Mossbauer spectroscopy)].

## - Watch Video Solution

41. if only one electron of an atom get exited still more
line observe in spectrum Why ?

- Watch Video Solution

42. If electron transits from $n=5$ to $n=2$ it belong which
series.?

D Watch Video Solution
43. Emission spectrum of gaseous atom is linear but not cureve Why ?

## D Watch Video Solution

44. 

In
emission
spectra
$n_{2} \rightarrow, n_{3} \rightarrow n_{1} n_{4} \rightarrow n_{1}, n_{5} \rightarrow n_{1} \quad$ tansition $\quad$ are
respectively for energy $E_{1}, E_{2}, E_{3}, E_{4}$ So what is the order of energy ?

- Watch Video Solution

45. 

$n_{2} \rightarrow n_{1}, n_{3} \rightarrow n_{2}, n_{4} \rightarrow n_{3}, n_{5} \rightarrow n_{4}$ transition are
respectively for energy of $E_{1}, E_{2}, E_{3}, E_{4}$ so what is the order of energy.

## D Watch Video Solution

46. State the angular momentum when electron revent orbits?

- Watch Video Solution

47. How much radius are there in stationary orbitals ?

## - Watch Video Solution

48. When the energy of electron taken zero?

- Watch Video Solution

49. What is ionization energy of an atom ?

- Watch Video Solution

50. State the species having one electron.

- Watch Video Solution

51. Give the equation to calculate energy of one electron.

## - Watch Video Solution

52. The velocity of electron in orbit depends on which factors?
(D) Watch Video Solution
53. How the energy of an electron change in orbit ?
54. The intensity of lines in spectrum depends on which factor?

D Watch Video Solution
55. What is Zeman effect and stark effect ?

D Watch Video Solution
56. State Debroglie principle

D Watch Video Solution
57. State Heisenberg principle

## D Watch Video Solution

58. the beam of electron is differented ? What is it indicates?

D Watch Video Solution
59. What is the characterstrics of electron microscopy
? It depends on which principle?

- Watch Video Solution


## 60. All maters has nature ? Why

## D Watch Video Solution

61. What is the wavelength of object having 0.1 kg ? What it indicate?

- View Text Solution

62. What is the wavelength electron ? What it indicate
?

Watch Video Solution
63. Which type of dimension require for position of electron?

## D Watch Video Solution

64. How the electron is observed?

## D Watch Video Solution

65. What is the implication uncertainty principle of existence of definite path of tradectories of electron?
66. What is the uncertainty $\Delta v . \Delta x$ for 1 mg object?

What in indicate?

## D Watch Video Solution

67. What is the value of $\Delta v . \Delta x$ (uncertaintly) for electron ?What it indicate?

## D Watch Video Solution

68. Which elements does not posses neutron?
69. when electron strike with ZnS it shhows fluorescent what is indirector?

- Watch Video Solution

70. What is the difference between photon and quantum?

- Watch Video Solution

71. Which type of metal used in photoelectric cell give
example.

- Watch Video Solution


## 72. What is quantum mechanics ?

## D Watch Video Solution

## 73. Who developed quantum mechanics ?

- Watch Video Solution

74. Who developed fundamental equation of quantum mechanics?

- Watch Video Solution

75. Give the equation for system such as quantum or a molecule whose energy does not change with time.

D Watch Video Solution
76. What is $\mathbf{W}$ ?

D View Text Solution
77. What is $|W|^{2}$ ? What is indicate ?

D View Text Solution
78. The energy of hydrogen and species like it depends on which factor ? And not depends on which factor?

## - Watch Video Solution

79. The energy of hydrogen and species like it depends on which factor ? And not depends on which factor?

## - Watch Video Solution

80. How is the solution of Schrodinger equation for multielectron atom ?
81. What is atomic orbital ?

- Watch Video Solution

82. How the atomic orbitals are distingulshed from each other?

- Watch Video Solution

83. What is indicated by $n, l$ and $m_{l}$ ?

- Watch Video Solution


## 84. What is nodal plane?

## D Watch Video Solution

85. From where the first orbital of $s, p, d, f$ start ?

## D Watch Video Solution

86. Which p, d, f orbitals are not possible? Why ?

- Watch Video Solution

87. what is the difference between 2 p and 2 s ?
88. What is the difference in $2 p_{x}, 2 p_{y}, 2 p_{z}$ ?

D Watch Video Solution
89. What is the similarity in $2 p_{x}, 2 p_{y}$ and $2 p_{z}$ ?

- Watch Video Solution

90. $2 \mathrm{p}, 3 \mathrm{p}, 4 \mathrm{p}, 5 \mathrm{p}$ arrange these orbitals in increasing order of energy ?
91. State the number of radial nodes in $2 p, 3 p, 4 p, 5 p$ orbitals

- Watch Video Solution

92. How many orbital a are there in sushell ?
(D) Watch Video Solution
93. How many orbital a are there in sushell ?

- Watch Video Solution


## 94. The number of orbitals depends on which quantum

 number and not depends on which quantum number?
## D Watch Video Solution

## 95. Where is the nodal plane in $P_{x}, P_{y}$ and $P_{z}$ orbital ?

## D Watch Video Solution

96. how many angular node in $d_{x}$ orbital which ?

- Watch Video Solution


## 97. How is the angular node in s,p,d,f

## D Watch Video Solution

98. What is the difference in energy of 2 s orbitals of hydrogen and 2 s orbital of other atoms?

- Watch Video Solution

99. Give the energy order of 2 s orbitals of $\mathrm{H}, \mathrm{Li}, \mathrm{Na}, \mathrm{K}$.
100. Give the relation between energy of orbital and atomic number is same energy level ?

D Watch Video Solution
101. Which one has higher energy 4s and 3d ? why ?

- Watch Video Solution

102. For both $2 p$ and $3 s$ orbital value of $(n+1)$ is same ie
103. than which one has less energy from both ? Why ?

## 103. Which orbitals are then in hydrogen atom ?

## D Watch Video Solution

104. What is the difference in ground state and exicited state of hydrogen?

- Watch Video Solution

105. State the name of orbitals as per quantum
number, magnetic quantum number and no of oribitals.
$(i) n=3, l=2(i i) n=4, l=3$
$(i i i) n=2, l=0(i v) n=5, l=1$

## D Watch Video Solution

106. From the following in which pair of orbitlas have
more attraction with nucleus
(i) 4 f and 5 d (ii) 4 d and 5 s (iii) 7 s and 5 f,
(ii) 7 p and 5 p ( v ) 3d and $3 f$

- Watch Video Solution


## 107. which of is correct for He ?



D Watch Video Solution
108. Which element has electron configuration
$1 s^{2} 2 s^{2} 2 p^{2} ?$

- Watch Video Solution

109. State all four Quantum number of valence electron of Ca Z=20
110. State the electron configuration of atom having $(z=16)$ Mention that how many $p$ electron are there in and give the number of half filled and full filled orbitals

- Watch Video Solution

111. Ion having $\mathbf{- 2}$ charge posses electron configuration
$1 s^{2} 2 s^{2} 2 p^{6}$ state the ion ?

D Watch Video Solution
112. One atom has $(z=25)$ state $s$ electron

- Watch Video Solution

113. if $n=3$ than state in number of orbitals and electron?

- Watch Video Solution

114. State the element in which valence electron are
$2 p^{4}, 3 s^{2}, 3 p^{3}$

D Watch Video Solution

## 115. Arrange in increasing order of energy

(I) $\mathrm{n}=2, \mathrm{I}=\mathbf{0}, m_{1}=0 m_{s}=\frac{1}{2}$
(ii) $n=2, l=1, m_{1}=+1, m_{s}=\frac{1}{2}$
$(i i) n=3, l m_{1}=+1, m_{s}=\frac{1}{2}$
$(i v) n=3, l=m_{l}=-1 m_{s}=+\frac{1}{2}$

## D Watch Video Solution

116. How many nods are there in 4 s and 3 s ?

## D Watch Video Solution

117. Which one is more closer to nucleus from $2 p$ and $3 p$ ?

## - Watch Video Solution

118. Which one is more closer to nucleus in $4 s^{2}$ and $3 d^{10} 4 s^{0}$ and $3 d^{10}$

## - Watch Video Solution

119. What is the relation in shape of $3 d_{x y}$ and $3 d x_{2}$ ?

D Watch Video Solution
120. State the number of Radial node and angular nod of 5 F ?

## 121. What is the spin of two electron in He ?

## D Watch Video Solution

122. Which orbitals are equinian orbitals from the given ?

- View Text Solution

123. How many maximum electron can be filled in $d$ and
f orbitals?

## - Watch Video Solution

124. Calculate the vlue of $(n+l)$ for 3 d

- Watch Video Solution

125. State the value of $n, l, m_{l}$ and $m_{s}$ for 4 f.

- Watch Video Solution

126. How many orbitals are thre in $4 f$ shell ?

D Watch Video Solution

## 127. State minimum value of $\mathbf{n}$ and I for $f$ orbital

## D Watch Video Solution

128. Which of the following are isoelectronic species
l.e. Those having the same number of electron ?
$N a^{+} K^{+} \mathrm{Mg}^{2+}, \mathrm{Ca}^{2+}, \mathrm{S}^{2-} \mathrm{Ar}$

## D Watch Video Solution

129. Write the electronic configuration of the following ions :

$$
(a) H^{-}(b) N a^{+}(c) O^{2-}(d) F^{-}
$$

## - Watch Video Solution

130. What are the atomic numbers of elements whose outermost electron are represented by
(a) $3 s^{1}(b) 2 p^{3}$ and (c) $3 p^{5}$ ?

## D Watch Video Solution

131. Which atom are indicated by the following configuration ?

D View Text Solution
132. What is the lowest value of $n$ that allows $g$ orbitals to exist ?

## - Watch Video Solution

133. An electron is in one of the 3d orbitals .Give the
possible values of $\mathbf{n}, l$ and $m_{l}$ for this electron.

- Watch Video Solution

134. An atom of an element contains 29 electron and

35 neutrons .Deduce (i) The number of protons and (ii)
the electronic configuration of the element .

## - Watch Video Solution

135. Give the number of electron in the species $\mathrm{H}_{2}^{+} \mathrm{H}_{2}$
and $O_{2}^{+}$
( Watch Video Solution
136. An atom orbitals has $n=3$. What are the possible
values of $I$ and $m_{l}$ ?

- Watch Video Solution

137. list the quantum number ( $m_{l}$ and $l$ ) of electrons for 3d orbital

## D Watch Video Solution

138. Which of the following orbitals are possible

1p, 2s, 2p, 3f

- Watch Video Solution

139. using s,p,d notations describle the orbital with the
following quantum numbers.
(a) $n=1, I=0$ (b) $n=3, I=1$ (c) $n=4, I=2$
( d) n=4, l=3

## D Watch Video Solution

140. Explain giving reasons which of the following sets
of quantum number are not possible
(a) $\mathbf{n}=\mathbf{O}, \mathrm{l}=\mathbf{0} m_{l}=0, m_{s}=+\frac{1}{2}$
(b) $\mathbf{n = 1}, \mathrm{I}=\mathbf{0} m_{l}=0, m_{s}=-\frac{1}{2}$
(c) $n=1, l=1, m_{l}=0, m_{s}=+\frac{1}{2}$
(d) $n=2, l=1, m_{l}=0, m_{s}=\frac{1}{2}$
(e) $\mathrm{n}=3, \mathrm{I}=3, m_{l}=3, m_{s}=+\frac{1}{2}$
(f) $\mathrm{n}=\mathbf{3}, \mathrm{l}=\mathbf{1}, m_{l}=0, m_{s} l=+\frac{1}{2}$
141. How many electron in an atom may have the following quantum number ?
(a) $\mathrm{n}=4, m_{s}=-\frac{1}{2}(b) n=3, l=0$

## D Watch Video Solution

## Section C Multiple Choice Question Mcqs

1. Which of the following statement is incorrect regarding cathode rays ?
A. a) Characteristics cathode rays do not depends upon the material of electrode.
B. b) Characteristics cathode rays do not depends
upon the nature of the gas.
C. c) Cathode rays have no mass and charge
D. d) Cathode rays orginate from the cathode.

## Answer: C

## D Watch Video Solution

2. Proton is
A. an ionisded hydrogen atom
B. an ionised hydrogen molecule

## C. an $\alpha$ particle

D. a negatively charged particle

## Answer: A

## D Watch Video Solution

3. Which of the following properties is associated with
whole number for an atom ?
A. Atomic radius
B. Atomic mass
C. Atomic
D. Atomic number

## Answer: D

## D Watch Video Solution

4. By which of the following equation atomic mass can be known ?
A. $\mathrm{Z}+\mathrm{n}$
B. $\mathbf{Z}+e^{-}$
C. $\mathbf{N}+e^{-}$
D. $Z+N$

Answer: A
5. State the species in which electron proton and neutron are $10,8,8$ respectively ?
A. ${ }_{8}^{12} O^{2-}$
B. ${ }_{8}^{16} O$
C. ${ }_{8}^{16} O^{2-}$
D..$_{8}^{16} \mathrm{O}^{-}$

Answer: C

D Watch Video Solution
6. The number of proton neutron and electron respectively . ........... And ......... ? .
A. 1,3,1
B. 1,2,1
C. 1,0,1
D. 2,1,0

Answer: B

D Watch Video Solution
7. What is not same in ${ }_{17}^{35} C I$ and ${ }_{17}^{37} C I$ ?

# A. Electron 

B. Proton

C. Neutron
D. Nucleon

## Answer: C

## D Watch Video Solution

## 8. What is same in isotone?

A. Electron

B. Proton

C. Neutron
D. Nucleon

## Answer: C

## D Watch Video Solution

## 9. What is used in Rutherford experiment ?

A. Cathode rays
B. $\mathrm{He}^{2+}$ rays

## C. X-rays

D. $\gamma$ rays

Answer: B

## D Watch Video Solution

10. The spectral line obtained when electron jumps
from $n_{1}=6$ to $n_{2}=2$ state in hydrogen atom belongs to the
A. Pfund series
B. Pachen series
C. Lyman series
D. Balmer series

## Answer: D

11. The splitting of the spectral lines under the influence of magnetic field is called
A. Photoelectric effect
B. Zeeman effect
C. diffraction
D. Interference

Answer: B
12. The spliting of spectral line in magnetic and electrical field is known as .
A. Photoelectron and stark effect
B. Zeman and stark effect
C. Stark and zeman effect
D. Photoelectron and zeman effect

Answer: B

- Watch Video Solution

13. State True (T) or False (F ) for following statements
A. As the frequency is more wavelength is less
B. As the frequency is more energy is less
C. As the frequency is more energy is more
D. As the frequency is more wavelength is more

Answer: A

- Watch Video Solution

14. Which of the following sentences is not true ?
A. Light is a beam of photon
B. Light has wave nature so it diffracted.

# C. Light has particle nature so balck body radiation 

 observe.D. Light require air as medium

## Answer: D

## D Watch Video Solution

15. From the following which equation is not the form of de - broglis equation?
A. Kinetic energy $\frac{2 h v}{\lambda}$
B. $\lambda m=\frac{h}{v}$
C. $\lambda p=h$
D. Kinetic energy $=\frac{h v}{2 \lambda}$

Answer: A

## - Watch Video Solution

> 16. How many orbitals are there if
> $n=3, l=2, m_{l}=+2$ ?
A. 1
B. 2
C. 3
D. 4

## D Watch Video Solution

17. The Uncertainty principle is important for
A. moving $\alpha$ particle

## B. rocket

C. Electron
D. All

Answer: C
(D) Watch Video Solution
18. How many maximum number of electrons in 3p
orbital have spin quantum number $s=+\frac{1}{2}$ ?
A. 0
B. 6
C. 3
D. 2

Answer: C

- Watch Video Solution

19. Which is the correct set of all four quantum number for valance electron of Na ?
A. $1,-0,0,+\frac{1}{2}$
B. $2,1,1+\frac{1}{2}$
C. $3,0,0+\frac{1}{2}$
D. $3,1,0,+\frac{1}{2}$

Answer: C

D Watch Video Solution

## 20. Which quantum number indicates the orientation

 of oribitals space under magnetic field ?A. $n$
B. $s$
C. I
D. $m$

## Answer: D

©
21. Which pair is true from the following ? a-aufbau principle-1 mvr b-angular momentum-2-orientation of electron in orbital c-hunds rule-3 order of orbital energy
A. b>1
B. a>1
C. c>1
D. $b>3$

Answer: A
22. Which one is the most stable electron

## configuration ?



- Watch Video Solution

23. How many orbitals upton $n=4$ ?
A. 8
B. 30
C. 16
D. 4

## Answer: B

## D Watch Video Solution

24. Which will be the oribital when $n=+12$ ?
A. $s$
B. $p$
C. d
D. $f$

## Answer: C

## - Watch Video Solution

Section C Mcqs Asked In Competitive Exam

1. Which quantum number indicate $\mathrm{s}, \mathrm{p}, \mathrm{d}, \mathrm{f}$ orbitals ?
A. $n$
B. $s$
C.I
D. $m$

Answer: C
2. Give number of unpaired electron in $N i^{2+}$
A. 0
B. 1
C. 3
D. 2

## Answer: D

D Watch Video Solution
3. The electron configuration $1 s^{2} 2 s^{2} 2 p^{6} 3 s^{2} 3 p^{2}$ is for
........ Element
A. c
B. $p$
C. si
D. $s$

Answer: C

- Watch Video Solution


# 4. It $\mathrm{n}=6 \mathrm{l}=1 \mathrm{p}$ orbital $\mathrm{m}=0$. Then the max electron in p 

 orbital are ......A. 6
B. 2
C. 4
D. 10

Answer: B

- Watch Video Solution

5. When electron transist from higher energy level to lower energy level then .....
A. energy absorb
B. energy emits
C. atomic number increase
D. atomic number decreases

Answer: B

D Watch Video Solution

## 6. Which ion does not posses electron cofiguration like

$N e ?$
A. $N a^{+}$
B. $F^{-}$
C. $M g^{2+}$
D. $C I^{-1}$

## Answer: D

- Watch Video Solution

7. From the following orbitals of which electron configuration violates Aufbau principle ?


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8. the electron configuration of nitrogen is
$1 s^{2} 2 s^{2} 2 p_{x}^{1} 2 p_{y}^{1} 2 p_{z}^{1}$ instead of
$1 s^{2} 2 s^{2} 2 p_{x}^{2} 2 p y^{1}$ is decided by ..

# A. Paulis principle 

## B. Aufbau principle

C. Hund.s rule
D. Ritz rule

## Answer: C

## D Watch Video Solution

9. The spectra of $\mathrm{He}^{+}$is similar as ....
A. $L i^{+}$
B. Na
C. He
D. H

## Answer: D

## D Watch Video Solution

10. Which type of spectra obtained if electron transists
from M - orbit to L- orbit ?
A. absorption

B. emission

C. continuous
D. spectra will not obtain

Answer: B

## D Watch Video Solution

11. what changes occurs in energy of Bohr's orbit ?
A. increase away from nucleus
B. does not change away from nucleus
C. decrease away from nucleus
D. none

Answer: A
12. How many unpaired electrons are present in p orbital of oxygen ?
A. 0
B. 1
C. 2
D. 3

## Answer: C

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13. Which series of lines obtained in ultraviolet region in hydrogen spectra ?
A. Paschen

B. Balmer

C. Lyman
D. Pfund

Answer: C

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## 14. In hydrogen atom for which change higher energy

## required?

A. $n=3$ to $n=5$
B. $\mathrm{n}=1$ to $\mathrm{n}=2$
C. $n=2$ to $n=3$
D. $n=2$ to $n=1$

Answer: B
(D) Watch Video Solution
15. give electron configuration of $F e^{+3}$ in its ground state .
A. $[A r] 3 d^{3} 4 s^{2}$
B. $[A r] 3 d^{5} 4 s^{2}$
C. $[A r] 3 d^{6}$
D. $[A r] 3 d^{5}$

## Answer: D

- Watch Video Solution

16. Which are isoelectronic from the following
A. $C r^{+3}, A r$
B. $S i^{+4}, P^{+3}$
C. $M g^{2+}, N a$
D. $A r, C I$

## Answer: D

## D Watch Video Solution

# 17. If atomic number is $(z=26)$ then given number of $3 d$ 

 electrons .A. 6
B. 8
C. 4
D. 5

Answer: A

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18. the four quantum number of the outermost electron of $k(z=19)$ are
A. $n=4, \mathrm{l}=0, \mathrm{~m}=0, \mathrm{~s}=+\frac{1}{2}$
B. $\mathrm{n}=4, \mathrm{l}=0, \mathrm{~m}=1, \mathrm{~s}=+\frac{1}{2}$
C. $\mathrm{n}=3, \mathrm{l}=0, \mathrm{~m}=0, \mathrm{~s}+\frac{1}{2}$
D. $n=3, l=2, m=-1, s=+\frac{1}{2}$

Answer: A

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19. From the following which one is heavier particle?
A. positron
B. photon
C. neutron
D. proton

Answer: C
20. When $\alpha$-particles are made incident on a thin metal foil most of them pass straight through the foil because .
A. most part of the atom is empty
B. $\alpha$-particles are positively charged
C. $\alpha$-particle move with high velocity
D. $\alpha$ particle are positively charged

Answer: A

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21. In hydrogen atom electron jumps from $3^{\text {rh }}$ to $2^{\text {nd }}$ energy level the energy released is
A. $3.03 \times 10^{12} \mathrm{Ja} \rightarrow \mathrm{m}^{-1}$
B. $1.03 \times 10^{19} \mathrm{Ja} \rightarrow \mathrm{m}^{-1}$
C. $6.06 \times 10^{19} \mathrm{Ja} \rightarrow m^{-1}$
D. $3.03 \times 10^{19} \mathrm{Ja} \rightarrow \mathrm{m}^{-1}$

## Answer: C

## D Watch Video Solution

A. increase with increase in speed of electron.
B. remains same irrespective of speed of electron
C. decreases with increases in speed of electron
D. is zero

## Answer: C

## - Watch Video Solution

23. What is the ratio of mass of proton and electron ?
A. $1.836 \times 10^{3}$
B. 1.836

## C. $1.836 \times 10^{2}$

D. $1.836 \times 10^{4}$

Answer: A

## - Watch Video Solution

24. According to Bohr's theory of hydrogen atom
which of the following is quantised for and electron ?
A. Angular momentum
B. Angular acceleration
C. Accelaration
D. Velocity

## D Watch Video Solution

25. The electrons identified by quantum numbers $n$
and $I$, (i) $n=4, I=1$ (ii) $n=4, I=0$ (iii) , $n=3 I=2$ and (iv)
$\mathrm{n}=3, \mathrm{l}=1$ can be placed in order of increasing energy
from the lowest to highest as
A. $(i v)<(i i i)<(i i i)<(i)$
B. $(i i)<(i v)<(i)<(i i i)$
C. $(i)<(i i i)<(i i)<(i v)$
D. $(i i i)<(i)<(i v)<(i i)$

## Answer: A

## D Watch Video Solution

26. Assertion (A) : The $19^{\text {th }}$ electron in potassium atom eneters into 4 s - orbital and not the 3d- orbital Reason
( $\mathrm{R}:(\mathrm{n}+\mathrm{I})$ rule is followed for determining the orbital of the lowest energy state. The correct choice is
A. Both (A) and (R) are true and (R) is the correct explanation of (A)
B. both (A) and (R) are true but (R) is not the
C. (A) is true but (R) is not true
D. (A) is not true but ( $R$ ) is true

Answer: A

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27. Assertion (A) : The orbital cannot have more than two electrons >

Reason (R) Two electrons in an orbital create opposite magnetic field . The correct choice is
A. both (A) and (R) are true (R) is the correct
B. both (A) and (R) are true but (R) is not the correct explanation of (A)
C. (A) is true but (R) is not true
D. (A) is not true but ( $R$ ) is true

Answer: B

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28. the electron configuration of an element is
$1 s^{2} 2 s^{2} 2 p^{6} 3 p^{6} 3 d^{5} 4 s^{1}$ this represents .....
A. excited state
B. ground state

## C. cationic

D. anionic state

## Answer:

## D Watch Video Solution

29. Which one is least stable in from following
A. $L i^{-}$
B. $B^{-}$
C. $B e^{-}$
D. $C^{-}$

## Answer: C

## D Watch Video Solution

30. The correct set of quantum number for 4d electron
A. $4,3-1+\frac{1}{2}$
B. $4,2,1,-\frac{1}{2}$
C. $4,3,2+\frac{1}{2}$
D. $4,2,1,0$

Answer: B
31. Iso - electronic species are
A. $F^{-}, O^{-2}$
B. $F^{-} O$
C. $F^{-}, O^{+}$
D. $\mathrm{F}^{-}, \mathrm{O}^{+2}$

Answer: A

## D Watch Video Solution

32. the charge of an electron is $-1.6 \times 10^{19} \mathrm{C}$. the value of free charge on $\mathrm{Li}^{+}$ion will be
A. $3.6 \times 10^{19} C$
B. $1 \times 10^{19} \mathrm{C}$
C. $1.6 \times 10^{19} C$
D. $2.6 \times 10^{19} C$

## Answer: C

## D Watch Video Solution

33. The frequency of yellow light having wavelength

600 nm is
A. $5.0 \times 10^{14} \mathrm{~Hz}$
B. $2.5 \times 10^{7} \mathrm{~Hz}$
C. $5.0 \times 10^{7} \mathrm{~Hz}$
D. $2.5 \times 10^{14} \mathrm{~Hz}$

Answer: A

## D Watch Video Solution

34. Give number of unpaired electron in $N i^{2+}$
A. 0
B. 1
C. 3
D. 2

## Answer: D

## D Watch Video Solution

35. The atomic number of an element is 35 . What is the total number of electrons present in all the $p$-orbitals of the ground state atom of that element
A. 6
B. 11
C. 17
D. 23
A. decreases
B. increases
C. remain same
D. none

Answer: B
37. What is the mass of photon having wavelength 3.6

A
$\left(h=6.6 \times 10^{34} \mathrm{kgm}^{2} \mathrm{~s}^{-1}, c=3 \times 10^{8} \mathrm{~ms}^{-1}\right)$
A. $8.212 \times 10^{31} \mathrm{~kg}$
B. $5.687 \times 10^{34} \mathrm{~kg}$
C. $6.135 \times 10^{33} \mathrm{~kg}$
D. $7.256 \times 10^{32} \mathrm{~kg}$

Answer: C
(D) Watch Video Solution

## 38. the nucleus of an element contain 9 protons

its valency would be
A. -1
B. 3
C. 2
D. 5

Answer: A

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39. Which of the following ion has the highest number of the upaired electrons?
A. $F e^{3+}$
B. $F e^{2+}$
C. $N i^{2+}$
D. $C O^{2+}$

Answer: A
(D) Watch Video Solution

## 40. What is the mass of photon having wavelength 3.6

A
$\left(h=6.6 \times 10^{34} \mathrm{kgm}^{2} \mathrm{~s}^{-1}, c=3 \times 10^{8} \mathrm{~ms}^{-1}\right)$
A. $6.135 \times 10^{29} \mathrm{~kg}$
B. $3.6 \times 10^{29} \mathrm{~kg}$
C. $6.135 \times 10^{33} \mathrm{~kg}$
D. $3.6 \times 10^{17} \mathrm{~kg}$

Answer: A

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# 41. The nature of anode rays depends upon 

A. Nature of electrone
B. Nature of residual gas
C. Nature of discharge tube

## D. all the above

## Answer: B

## D Watch Video Solution

42. If magnetic quantum number is -3 then the principle quantum number can be
A. 1
B. 2
C. 3
D. 4

## Answer: D

## D Watch Video Solution

43. Which one is not correct ?
A. $n=4, l=2, m=0$

$$
\text { B. } n=4, l=1, m=0
$$

C. $n=4, l=4, m=1$
D. $n=4, l=0, m=0$

## Answer: C

## D Watch Video Solution

44. Which of the following has maximum number of unpaired electrons?
A. $F e^{3+}$
B. $\mathrm{Fe}^{2+}$
C. $\mathrm{Co}^{2+}$
D. $\mathrm{Co}^{3+}$

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45. Isotone of ${ }_{32}^{76} G e$ is : ......
A..$_{32}^{37} G e$
B. ${ }_{33}^{77} A s$
C. ${ }_{34}^{77} \mathrm{Se}$
D. ${ }_{36}^{78} S c$

Answer: B
46. Magnitude of K.E. in an orbit is equal to
A. Half of the potential energy
B. Twice of the potential energy
C. One fourth the potential energy
D. None of these

Answer: A

## D Watch Video Solution

47. For one atom the energy difference between excited state ground state is $4.4 \times 10^{-4} J$ Then what
will be wavelength of photon?
A. $2.26 \times 10^{12} m$
B. $1.13 \times 10^{12} m$
C. $4.25 \times 10^{12} m$
D. $4.52 \times 10^{12} \mathrm{~m}$

Answer: D

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48. Nuclear theory for atom was given by
A. Rutherford

B. Einstein

## C. Neil bohr

D. J.J. Thomson

Answer: A

## D Watch Video Solution

49. How many electrons in $2 p$ orbital have spin
quantum number $s=\frac{1}{2}$ ?
A. 6
B. 0
C. 2
D. 3

Answer: D
(D) Watch Video Solution
50. Which orbital is non directional ?
A. $4 p$
B. 4d
C. $4 f$
D. 3s

# 51. Rutherford experiment prove 

A. Electron

B. Proton

C. Atom
D. Nucleon

## Answer: D

- 

52. Give no. of energy state, orbital and electrons in $\mathbf{N}$ orbital.
A. 4,12,32
B. 4,16,30
C. 4,16,32
D. 4,32,64

## Answer: D

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53. Calculate the energy of 1 mole of photon whose
frequency is $5 \times 10^{14} \mathrm{~Hz}$
A. 19.951 * Kj
B. 199.51 kJ
C. 39.90 kj
D. 399.0 kj

Answer: C

D Watch Video Solution
54. Three unpaired electron of nitrogen atom can be examplained by ...
A. Paulis rule

B. Aufbau principle

C. Uncertainity principle
D. Hund.s rule

Answer: B

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55. the energy of electron in first energy level is $-21.79 \times 10^{12} \mathrm{erg} /$ atom. What will be energy in second energy level ?
A. $-54.47 \times 10^{2} \mathrm{erg} / a \rightarrow m$
B. $-5.447 \times 10^{12} \mathrm{erg} / a \rightarrow m$
C. $-5.5447 \times 10^{12} \mathrm{erg} / a \rightarrow m$
D. $0.05447 \times 10^{12} \mathrm{erg} / a \rightarrow m$

Answer: B

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56. An electron from one Bohr stationary orbit can go to next higher orbit
A. by emission of electromagnetic radiation
B. by absorption of electromagnetic radiation
C. by absorption of electromagnetic radiation of particular frequency .
D. without emission or absorption of electron magnetic radiation .

Answer: C
57. The most probable radius (in pm) for finding the electron in $\mathrm{He}^{+}$is
A. 0
B. 52.9
C. 26.5
D. 105.8

Answer: C

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58. IN which one of the following the number of protons greater than neutrons but number of protons is less than the number of electrons
A. $D_{3} O^{+}$
B. $\mathrm{SO}_{2}$
C. $\mathrm{H}_{2} \mathrm{O}$
D. $\mathrm{OH}^{-3}$

Answer: D

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59. Which set of quantum number is not possible

|  | $\mathbf{n}$ | $\boldsymbol{l}$ | m | $\mathbf{s}$ |  | $\mathbf{n}$ | $\boldsymbol{l}$ | m | s |
| :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- |
| (A) 3 | 2 | -2 | $+\frac{1}{2}$ | (B) | 4 | 0 | 0 | $+\frac{1}{2}$ |  |
| (C) 5 | 3 | $0-\frac{1}{2}$ | (D) 3 | 2 | -3 | $+\frac{1}{2}$ |  |  |  |

## D Watch Video Solution

60. Assertion (A ) : The probability of finding an electron in a small volume around a point ( $x, y, z$ ) at a diatance $r$ from the nucleus is proportional to square of orbital wave function. .
reason ( $R$ ) : subatomic particle have both wave and particle nature. The correct choice is
A. Both (A) and (R) are true and (R) is the correct explanation of (A)
B. Both (A) and (R) are true but (R) is not the correct explanation of (A )
C. is true but ( $R$ ) is not true
D. (A) is not true but (R) is true

Answer: B

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61. A body of mass $x k g$ is moving with velocity of
$100 \mathrm{~ms}^{-1}$ its de - broglie wavelength is
$6.62 \times 10^{-34} \mathrm{~m}^{-1}$ Hence x is ...

## ` $\left.h=6.62 \times 10^{\wedge}(-34) \mathrm{J} \mathrm{s}\right)$

A. 0.25 kg

B. 0.15 kg

C. 0.2 kg
D. 0.1 kg

Answer: D
(D) Watch Video Solution
62. Which of the following wave equation is trure ?
(A) $\frac{\partial^{2} \psi}{\partial x^{2}}+\frac{\partial^{2} \psi}{\partial y^{2}}+\frac{\partial^{2} \psi}{\partial z^{2}}+\frac{8 \pi^{2} m^{2}}{h^{2}}(E-V) \psi=0$
(B) $\frac{\partial \psi^{2}}{\partial x^{2}}+\frac{\partial \psi^{2}}{\partial y^{2}}+\frac{\partial \psi^{2}}{\partial z^{2}}+\frac{8 \pi^{2} m^{2}}{m^{2}}(\mathbb{E}-V \mid \psi=0$
(C) $\frac{\partial^{2} \psi}{\partial x^{2}}+\frac{\partial^{2} \psi}{\partial y^{2}}+\frac{\partial^{2} \psi}{\partial z^{2}}+\frac{8 \pi^{2} m}{h^{2}}(\mathrm{E}-$ V) $\psi=0$
(D) $\frac{\partial^{2} \psi}{\partial^{2} \psi}+\frac{\partial^{2} \psi}{\partial^{2} y}+\frac{\partial^{2} \psi}{\partial^{2} z}+\frac{8 \pi^{2} \mathrm{~m}}{\mathrm{~h}^{2}}(\mathrm{E}-V) \psi=0$

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63. What does the electron configuration $1 s^{2} 2 s^{2} 2 p^{5} 3 s^{1}$ indicate ?
A. ground state of fluorine

## B. excited state of fluorine

C. excited state of neon
D. excited state of the $O_{2}^{-1}$ ion

Answer: C

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64. Which of the following is true for number of electrons orbitals and type, orbitals present in N -orbit respectively?
A. 4, 4 and 8
B. 4,8 and 16

## C. 32,16 and 4

## D. 4,16 and 32

## Answer: C

## D Watch Video Solution

65. A metallic ion $\mathrm{m}^{2+}$ has na electronic configuration of $\mathbf{2 , 8 , 1 4}$ and the ionic weight is 56 amu . The number of neutron in its nucleus is
A. 30
B. 32
C. 34

## D. 42

Answer: A

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66. Calculate the wavelength of the light required to
break the bond between two chlorine atoms in a
chlorine molecule . The $\mathrm{Cl}-\mathrm{Cl}$ and bond energy is 243 kj
$\mathrm{mol}^{-1}$
$\left(n=6.6 \times 10^{34} \mathrm{JsC}=3 \times 10^{8} \mathrm{~ms}^{-1} \quad\right.$ Avogadrons
number $=6.02 \times 10^{23} \mathrm{~mol}^{-1}$ )
A. $8.18 \times 10^{31} m$
B. $6.26 \times 10^{21} \mathrm{~m}$
C. $4.91 \times 10^{-7} \mathrm{~m}$
D. $4.14 \times 10^{6} \mathrm{~m}$

## Answer: C

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67. A 600 W mercury lamp emits monochromatic
radiation of wavelength 313.3 nm . How many phtons
are emitted from lamp per second?

$$
\left(h=6.626 \times 10^{34} \mathrm{Js} \text { velocity of light } 3 \times 10^{8} \mathrm{~ms}^{-1}\right)
$$

A. $1 \times 10^{19}$
B. $1 \times 10^{20}$
C. $1 \times 10^{21}$
D. $1 \times 10^{22}$

Answer: C

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68. The shortest wavelength in hydrogen spectrum of
layman series when $R_{H}=109678{ }^{\text {'cm }}{ }^{\wedge}(-1)^{\prime}$ ' is
A. 1002.7A
B. 1215.67 A
C. 1234.7A

## D. 911.7 A

## Answer: D

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69. In which one of the following pairs the two species
are both isoelectronic and isotopic (atomic number $\mathbf{C a}$
$=2, A r=18, K=19 \mathrm{mg}=12, \mathrm{fe}=26, \mathrm{Na}=11$ )
A. ${ }^{40} \mathrm{Ca}^{2+}$ and.$^{40} \mathrm{Ar}$
B. . ${ }^{39} K^{+}$and.${ }^{40} K^{+}$
C. ${ }^{56} \mathrm{Fe}^{3+}$ and.${ }^{57} \mathrm{Fe}^{2+}$
D. . ${ }^{23} \mathrm{Na}$ and.${ }^{24} \mathrm{Na}^{+}$

Answer: B

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Section C Mcqs Asked In Jee Neet Aieee

1. Which orbital has dumbell shape?
A. $s$
B. p
C. d
D. f
2. How many electrons are present in $\mathrm{n}=3$ orbit ?
A. 2
B. 18
C. 8
D. 32

Answer: B

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3. If angular momentum quantum number $l=3$ then give possible values of magnetic quantum number $m$.
A. 0,1,2
B. $0, \pm 1, \pm 2 \pm 3$
C. $0,1,2,3$
D. $\pm 1, \pm 2, \pm 3$

Answer: B

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4. An atom has the electronic configuration of $1 s^{2}, 2 s^{2} 2 p^{6}, 3 s^{2} 3 d^{10}, 4 s^{2} 4 p^{5}$. Its atomic weight is $\mathbf{8 0}$. Its atomic number and the number of neutrons in its nucleus shall be
A. 35 and 45
B. 45 and 35
C. 40 and 40
D. 30 and 50

Answer: A

## 5. The maximum electron occupy in $f$ orbital are

A. 10
B. 18
C. 8
D. 14

Answer: D

## D Watch Video Solution

6. Three unpaired electron of nitrogen atom can be examplained by ...

# A. Aufbau principle 

B. Hund.s rule
C. Pauli.s exclusion principle
D. Heisenberg uncertainty

Answer: B

D Watch Video Solution
7. Which ion has 18 electron in its outermost orbit ?
A. $C u^{+}$
B. $K^{+}$
C. $\mathrm{Cs}^{+}$
D. $C I^{-1}$

## Answer: B

## D Watch Video Solution

## 8. Atomic radius of hydrogen atom H in Bohr.s model is

A. $0.529 \times 10^{7} \mathrm{~cm}$
B. $0.529 \times 10^{9} \mathrm{~cm}$
C. $0.529 \times 10^{8} \mathrm{~cm}$
D. $0.529 \times 10^{10} \mathrm{~cm}$

## - Watch Video Solution

9. Which one of the following ions has the largest number of unpaired d electrons ?
A. $Z n^{+2}$
B. $N i^{+3}$
C. $F e^{+2}$
D. $C u^{+2}$

Answer: C
10. The spectrum of he is expected to be similar to that of
A. H
B. Na
C. $\mathrm{He}^{+}$
D. $\mathrm{Li}^{+}$

## Answer: D

- Watch Video Solution


## 11. Which one is correct for hydrogen

A. The energy of 3d orbital is less than 3p
B. The energy of $3 p$ orbital is less than $3 d$
C. The energy of $3 \mathrm{~s} \& 3 \mathrm{p}$ is less than 3 d
D. $3 \mathrm{~s}, 3 \mathrm{p}$ \& 3d all orbitals have same energy

Answer: D

## D Watch Video Solution

12. The correct increasing order of energy is
A. $n s, n p,(n-1) d,(n-1) f$

# B. $n s,(n-1) p,(n-2) d,(n-2) f$ 

C. ns,np,(n-1)d,(n-2)f
D. $n s,(n-1) d, n p,(n-1) f$

## Answer: C

## D Watch Video Solution

13. Which one is correct for electron in $4 f$ orbital

|  | $\mathbf{n}$ | $\mathbf{l}$ | $\mathbf{m}$ | s |  | n | $\boldsymbol{l}$ | m | s |
| :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- |
| (A) | 4 | 3 | +4 | $+\frac{1}{2}$ | (B) | 4 | 4 | -4 | $-\frac{1}{2}$ |
| (C) 4 | 3 | +1 | $+\frac{1}{2}$ | (D) | 3 | 2 | -2 | $+\frac{1}{2}$ |  |

- 

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14. What will be the number of electron in ground state of Cr having subsidiary quantum number $\mathrm{I}=1$ and I=2 respectively ?

A. 12 and 4

B. 12 and 5
C. 16 and 4
D. 16 and 5

Answer: B

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15. What is the angular momentum of electron in $5^{\text {th }}$ orbit of Bohr.s model
A. $1.0 \frac{h}{\pi}$
B. 10 . $\frac{h}{\pi}$
C. 2.5. $\frac{h}{\pi}$
D. $25 . \frac{h}{\pi}$

Answer: C

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16. From the following which sets of ions is isoelectronic ?
A. $K^{+}, C I^{-}, C a^{2}, S c^{3}$
B. $B a^{+2}, S r^{2}, K^{+} s^{-2}$
C. $N^{-3} O^{-2} F^{-} S^{-2}$
D. $\mathrm{Li}^{+}, \mathrm{Na}{ }^{+}, \mathrm{Mg}^{-2}, \mathrm{Ca}{ }^{+2}$

Answer: A

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17. For an electron $\mathbf{v}=300 \mathrm{~ms}^{-1}$ and certainty in velocity is 0.001 \% what is the uncertainty in position
A. $5.76 \times 10^{2} m$
B. $1.92 \times 10^{2} m$
C. $3.84 \times 1^{2} m$
D. $19.2 \times 10^{-2} m$

Answer: B

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18. Who proposed that electron has wave nature ?

# A. Schrodinger 

B. De- Broglie
C. Heiseneberg
D. None

## Answer: B

## D Watch Video Solution

19. Which nuclear reaction produce isotope
A. emission of neutron
B. emission of positron

## C. emission of $\alpha$ particle

D. emission of $\beta$ particle

Answer: A

## D Watch Video Solution

20. Which of the following sets of quantum numbers represents the highest energy of an atom ?
A. $n=3, l=0 m=0, s=\frac{1}{2}$
B. $n=3, \mathrm{l}=1 \mathrm{~m}=1, \mathrm{~s}=\frac{1}{2}$
C. $\mathrm{n}=3, \mathrm{l}=\mathbf{2} \mathrm{m}=1 \mathrm{~s}=\frac{1}{2}$
D. $\mathrm{n}=4, \mathrm{l}=0 \mathrm{~m}=0 \mathrm{~s}=\frac{1}{2}$

Answer: C

## - Watch Video Solution

21. What is the orbital angular momentum for electron in 2 s orbital ?
A. $\frac{1}{2} \cdot \frac{h}{2 \pi}$
B. Zero
C. $\frac{h}{2 \pi}$
D. $\sqrt{2}$. $\frac{h}{2 \pi}$

Answer: B
22. The ionization energy hydrogen atom is 13.6 ev .The ionization energy of He
A. 13.6 eV
B. 54.4 eV
C. 122.4 eV
D. zero

Answer: B

- View Text Solution

23. Which of the following sets of quantum number is not possible ?

|  | $\mathbf{n}$ | $l$ | m | s |
| :---: | :---: | :---: | :---: | :---: |
| $(1)$ | 3 | 0 | 0 | $+\frac{1}{2}$ |
| $(2)$ | 2 | 2 | 1 | $+\frac{1}{2}$ |
| $(3)$ | 4 | 3 | -2 | $-\frac{1}{2}$ |
| $(4)$ | 1 | 0 | -1 | $-\frac{1}{2}$ |
| $(5)$ | 3 | 2 | 3 | $+\frac{1}{2}$ |

A. 1 and 3
B. 2,3 and 4
C. 1,2,3 and 4
D. 2,4 and 5

## Answer: D

## D View Text Solution

24. The ionization energy of hydrogen atom is
$1.312 \times 10^{6} \mathrm{Jmol}^{-1}$ calculate the energy require for jump of electron from $n=1$ to $n=2$
A. $9.56 \times 10^{5} \mathrm{j} / \mathrm{mol}$
B. $7.56 \times 10^{5} \mathrm{j} / \mathrm{mol}$
C. $9.84 \times 10^{5} \mathrm{j} / \mathrm{mol}$
D. $8.51 \times 10^{5} \mathrm{j} / \mathrm{mol}$

## 25. Which sets of ions is isoelectronic?

A. $\mathrm{NO}^{+}, \mathrm{C}_{2}^{-2} \mathrm{CN}^{-} \mathrm{N}_{2}$
B. $C N^{-1} \mathrm{~N}_{2} \mathrm{O}_{2}^{-2} \mathrm{C}_{2}^{-2}$
C. $\mathrm{N}_{2}, \mathrm{O}_{2}^{-1} \mathrm{NO}^{+} \mathrm{CO}$
D. $\mathrm{C}_{2}^{-2} \mathrm{O}_{2}^{-1} \mathrm{CO}$, No

Answer: A

D Watch Video Solution
26. the density of a nucleus of an atom is
A. $2.4 \times 10^{15} \mathrm{kgm}^{-3}$
B. $2.4 \times 10^{19} \mathrm{kgm}^{-3}$
C. $2.4 \times 10^{17} \mathrm{kgm}^{-3}$
D. $2.4 \times 10^{14} \mathrm{kgm}^{-3}$

Answer: C

## D Watch Video Solution

27. if uncertainty in position and momentum are equal
then uncertainty in velocity is
A. $\frac{1}{2 m} \sqrt{\frac{h}{\pi}}$
B. $\frac{1}{m} \sqrt{\frac{h}{2 \pi}}$
C. $\operatorname{squr}\left(\frac{h}{\pi}\right)$
D. $\operatorname{squr}\left(\frac{h}{\pi}\right)$

Answer: A

## D Watch Video Solution

28. Applying bohr.s model when electron of H atom comes from $n=4$ to $n=2$ calculate its wavelength
A. 4866 A
B. 5272 A
C. 4634 A
D. 5084A

Answer: A

## D Watch Video Solution

29. Calculate the wavelength (in nanometer) associated with a proton moving at $1.0 \times 10^{3} \mathrm{~ms}^{-1}$

$$
\begin{aligned}
& \text { (Mass proton }=1.67 \times 10^{-27} \mathrm{~kg} \quad \text { and } \\
& h=6.63 \times 10^{-34} \mathrm{Js} \text { ):- }
\end{aligned}
$$

A. 0.40 nm
B. 14. nm
C. 2.5 nm
D. 0.32 nm

Answer: A

## D Watch Video Solution

30. The maximum number of electron in subshell is given by expression .
A. 4I-2
B. 4I+2
C. 2l+1
D. $2 n^{2}$

Answer: B

## - Watch Video Solution

31. Which of the following is not permissible arrangement of electron in an atom ?

$$
\begin{aligned}
& \text { A. } n=5, l=3 m=0, s=+\frac{1}{2} \\
& \text { B. } \mathbf{n}=3, l=\mathbf{2} \mathbf{m}=-3, \mathbf{s}=\frac{1}{2} \\
& \text { C. } n=3, l=2 m=2, s=\frac{1}{2} \\
& \text { D. } n=4, l=0 n m=0 s=\frac{1}{2}
\end{aligned}
$$

Answer: B
32. ionisation energy of He is $19.6 \times 10^{-18} \mathrm{ja} \rightarrow \mathrm{m}^{-1}$

The energy of the first stationary state $(\mathrm{n}=1)$ of $L i^{+}$is
A. $4.14 \times 10^{16} a \rightarrow m^{-1}$
B. $4.14 \times 10^{-17} \mathrm{~J}$ atom
C. $2.2 \times 10^{15} \mathrm{~J}$ atom
D. $8.82 \times 10^{17} \mathrm{~J}$ atom

Answer: B

D Watch Video Solution
33. if a species has 16 proton 18 electron and 16 neutron find the species and its charge
A. $s^{-1}$
B. $S i^{2+}$
C. $p^{3-}$
D. $s^{2-}$

## Answer: D

- Watch Video Solution

34. A gas absorbs photon of 355 nm and emits two wavelength if one of the emission is at 680 nm the other is at .
A. 1035 nm
B. 325 nm
C. 743 nm
D. 518 nm

Answer: C

- Watch Video Solution


## 35. An ion has a charge of $\mathbf{- 1}$. It has eighteen electrons

## and twenty neutron mass number is

A. 17
B. 37
C. 18
D. 38

Answer: B

- Watch Video Solution

36. maximum number electrons in a subshell with I =3
and $n=4$ is
A. 10
B. 12
C. 14
D. 16

Answer: C

- View Text Solution

37. the correct set of the four quantum number for the
valence electron or Rubidum atom ( $\mathrm{z}=37$ ) is
A. $5,0,0,+\frac{1}{2}$
B. $5,1,9,+\frac{1}{2}$
C. $5,1,1,+\frac{1}{2}$
D. $6,0,0,+\frac{1}{2}$

Answer: A

- Watch Video Solution

38. The orbital angular momentum of a p- electron is
given as
A. $\frac{h}{\sqrt{2 \pi}}$
B. $\sqrt{3}$. $\frac{h}{2 \pi}$
C. $\sqrt{\frac{3}{2}} \cdot \frac{h}{\pi}$
D. $\sqrt{6}$. $\frac{h}{2 \pi}$

Answer: A

D Watch Video Solution
39. The electron identified by quantum number $\mathbf{n}$ and I
A. $n=4, l=1$
B. $n=4, l=0$
C. $n=3, l=2$
D. $n=3, l=1$

## Answer: B

## D Watch Video Solution

40. The value of plank constant is $6.63 \times 10^{10^{34} \mathrm{~kg}}$ the speeds light is $3 \times 10^{17} \mathrm{nms}^{-1}$ which value is clossed to the wavelength in nanometer of a quantum of light with frequency of $6 \times 10^{15} s^{-1}$ ?
A. 25
B. 50
C. 75
D. 10

Answer: B

## D Watch Video Solution

41. What is the maximum number of electrons that can
be associated with the following set of quantum
numbers?
$n=3, l=1$ and $m=-1$
A. 6
B. 4
C. 2
D. 10

Answer: B

## D Watch Video Solution

42. Energy of an electron is given by $\mathrm{E}=-2.718^{*} 10-18 \mathrm{~J}$

Wavelength of light required to excite an electron in a hydrogen atom from level $\mathbf{n = 1}$ to $\mathbf{n = 2}$ will be...
A. $1.214 \times 10^{-7} \mathrm{~m}$
B. $2.186 \times 10^{-7} \mathrm{~m}$
C. $6.500 \times 10^{-7} \mathrm{~m}$
D. $8.500 \times 10^{-7} \mathrm{~m}$

Answer: A

- Watch Video Solution

43. the correct set of the four quantum number for the
valence electron or Rubidum atom ( $\mathrm{z}=37$ ) is
A. $5,1,+\frac{1}{2}$
B. $5,1,1+\frac{1}{2}$
C. $5,0,1+\frac{1}{2}$

## D. $5,0,0+\frac{1}{2}$

Answer: D

## D Watch Video Solution

44. What is the maximum number of orbitals that can be identified with the following quantum number $\mathrm{n}=$

$$
3, l=1, m=0 .
$$

A. 1
B. 2
C. 3
D. 4

## D Watch Video Solution

45. Calculate the energy in corresponding to light of wavelength 45 nm . (Planck's constant $\mathbf{h}=6.63 \times 10^{-34}$

JS, Speed of light C $=3 \times 10^{8} \mathrm{~ms}^{-1}$ )
A. $6.67 \times 10^{15}$
B. $6.7 \times 10^{11}$
C. $4.42 \times 10^{-15}$
D. $4.42 \times 10^{-18}$

## Answer: D

46. What is the maximinn number of orbitals that can

## be identified with the following quantum number.

A. 1
B. 2
C. 3
D. 4

Answer: A
47. Based on equation $E=-2.178 \times 10^{-15} J \frac{z^{2}}{n^{2}}$ certain conclusion are written. Which of them is not correct ? $\mathrm{n}=3, \mathrm{l}=1$ and $\mathrm{m}=0$
A. Larger the value of $n$, the larger is the orbit radius
B. Equation can be used to calculate the change in
energy when the electron changes orbit.
C. For $\mathrm{n}=1$, the electron has a more negative
energy than it does for $\mathbf{n}=\mathbf{6}$ which means that
the electron is more loosely bound in the smallest allowed orbit.

## D. The negative sign in equation simply means that

the energy of electron bound to the nucleus is
lower than it would be if the electrons were at the infinite distance from the nucleus.

## Answer: C

## - Watch Video Solution

48. The angular $m$ om entum of electron in ' $d$ ' orbital is equal to
A. Oh
B. $\sqrt{6} \mathrm{~h}$
C. $\sqrt{2} \mathrm{~h}$
D. $2 \sqrt{2} \mathrm{~h}$

Answer: B

D Watch Video Solution
49. Which of the following is the energy of a possible excited state of hydrogen ?
A. +13.6 eV
B. -6.8 eV
C. -3.4 eV
D. +6.8 eV

## Answer: C

## D Watch Video Solution

50. A stream of electrons from a heated filament was
passed between two charged plates kept at a potential difference V esu. If e and m are charge and mass of an
electron, respectively, then the value of $h / \lambda$ (where $\lambda$ is wavelength associated with electron wave) is given by
A. $\sqrt{2 m e V}$
B. meV
C. 2 meV

$$
\text { D. } \sqrt{m e V}
$$

Answer: A

## D Watch Video Solution

51. Two electrons occupying the same orbital are distinguished by
A. Spin quantum number
B. Principle quantum number
C. Magnetic quantum numbe
D. Azimuthal quantum number

Answer: A

## D Watch Video Solution

52. How many electrons can fit in the orbital for which
$\mathrm{n}=3$ and $\mathrm{Z}=1$ ?
A. 2
B. 6
C. 10
D. 14

Answer: A
53. Which of the following pairs of d-orbitals will have electron density along the axes ?
A. $d_{z}^{2}, d_{x y}$
B. $d_{x y}^{2}, d_{y z}$
C. $d_{z}^{2}, d_{x^{2}-y^{2}}$
D. $d_{x y}^{2}, d_{x^{2}-y^{2}}$

## Answer: C

54. The energies $E_{1}$ and $E_{2}$ respectively. The relation between their wavelengths, i.e. $\lambda_{1}$ and $\lambda_{2}$ will be
A. $\lambda_{1}=\frac{1}{2} \lambda_{2}$
B. $\lambda_{1}=\lambda_{2}$
C. $\lambda_{1}=2 \lambda_{2}$
D. $\lambda_{1}=4 \lambda_{2}$

Answer: C

D Watch Video Solution
55. The frequency transition $n=4$ to $n=2$ of He+ is
equal to the transition in H atom corresponding to
which of the following.
A. $n=3$ to $n=1$
B. $n=2$ to $n=1$
C. $\mathrm{n}=32$ to $\mathrm{n}=1$
D. $n=4$ to $n=3$

Answer: B

- Watch Video Solution

56. $\frac{e}{m}$ ratio was determined by

A. j.j thomson

B. dalton
C. chadwick
D. goldstein

Answer: A

## (D) Watch Video Solution

57. The group having isoelectronic species is ....

$$
\text { A. } O^{2-}, f^{-}, N a^{+} . M g^{2+}
$$

$$
\text { B. } O^{-}, F^{-}, N a, M g^{+}
$$

C. $O^{2}, F^{-}, N a, M g^{2+}$
D. $\mathrm{O}^{-}, \mathrm{F}^{-}, \mathrm{Na}{ }^{+}, \mathrm{Mg}^{2+}$

Answer: A

- Watch Video Solution

58. The total num ber of orbitals present for principle quantum number $\mathrm{n}=4$ is
A. 12
B. 15
C. 16

## Answer: C

## - Watch Video Solution

## Section C Mcq Asked In Board Exam

1. The hydrogen electron de-exites from its 3rd excited
state. W hich are tru e and false statem ents for it.

Assign $T$ for true and $F$ for the false. (i) It emits the radiation giving the lines in the Lyman Balmer and

Paschen series. (ii) It emits radiation of only UV and
visible regions and not infrared region. (iii) It em its
the rad ia tio n of sm allest wavelength giving the line in Lyman series. (iv) It will emit the radiation of the highest frequency giving line in Pfund series
A. TFTF

B. FTFT

C. TTFF
D. FFTT

Answer: A

D Watch Video Solution
2. How many elements are there having electrons in dorbital among the elements with atomic number 1 to $100 ?$
A. 30
B. 60
C. 80
D. 20

Answer: C

- Watch Video Solution

3. $X$ and $Y$ both are $m$ oving particles. The uncertainty in measure of momentum of $Y$ is half than that of $X$. If uncertainity of position of $X$ is $\pm 0.05 A$ than that of $Y$ is
A. $2.5 \times 10^{-10} \mathbf{c m}$
B. $1 \times 10^{-10} \mathrm{~cm}$
C. $5 \times 10^{-10} \mathbf{c m}$
D. $1 \times 10^{-9} \mathrm{~cm}$

## Answer: D

4. The relative i s ......... proportion of the atoms of tritium and protium.
A. $10: 10^{17}$
B. $1: 10^{17}$
C. $10: 10^{7}$
D. $1 \times 10^{7}$

Answer: B

## D Watch Video Solution

5. A species ' $X$ ' contains 20 protons and 18 electrons.
(A) species ' $\gamma$ ' contains 18 protons and 18 electrons.

What are ' $X$ ' and ' $Y$ ' respectively ?

## A. Ca and Ar

B. $\mathrm{Ca}^{2+}$ and $S^{2-}$
C. $C a^{2+}$ and $C I^{-}$
D. $\mathrm{Ca}^{2+}$ and Ar

Answer: D

D Watch Video Solution
6. Which element has $n s^{2} n p^{5}$ type electronic configuration in its outermost shell
A. carbon
B. chlorine
C. Neon
D. Aluminium

Answer: B

## D Watch Video Solution

7. The introduction of neutron in nucleus of an atom
would lead to the change in........
A. atomic weight
B. Atomic number
C. Number of electrons around a nucleus
D. Chemical nature of the atom

## Answer: A

## - Watch Video Solution

8. Match the species of Column - $X$ with the electron configuration of the elements in the Column - Y and select correct answer

| Column - X | Column - Y |
| :---: | :---: |
| (i) ${ }_{22} \mathrm{TI}^{2+}$ | (P) $(\mathrm{n}-1) \mathrm{d}^{4} \mathrm{~ns}{ }^{2}$ |
| (ii) ${ }_{30} \mathrm{Zn}$ | (Q) ( $\mathrm{n}-1) \mathrm{d}^{19} \mathrm{~ns}^{1}$ |
| (iii) ${ }_{24} \mathrm{Cr}$ | (R) ( $\mathrm{n}-\mathrm{H}) \mathrm{d}^{2} \mathrm{~ns}^{\prime \prime}$ |
| (iv) ${ }_{29} \mathrm{Cu}$ | (S) ( $n-1$ l $d^{5} n s^{\text {b }}$ |
|  | (M) ( $\mathrm{n}-1) \mathrm{d}^{10} \mathrm{~ns}^{2}$ |
|  | (N) $(\mathrm{n}-1) \mathrm{d}^{10} \mathrm{~ns}^{2}$ |

A. $(i) \rightarrow M,(i i) \rightarrow N,(i i i) \rightarrow P,(i v) \rightarrow Q$
B. $(i) \rightarrow R,(i i) \rightarrow N,(i i i) \rightarrow P,(i v) \rightarrow S$
C. $(i) \rightarrow M,(i i) \rightarrow Q,(i i i) \rightarrow S,(i v) \rightarrow R$
D. $(i) \rightarrow R,(i i) \rightarrow N,(i i i) \rightarrow S,(i v) \rightarrow Q$

## Answer: D

## D Watch Video Solution

## 9. For the third electron of Lithium atom moving in its

premissible orbit, the values of angular momentum and energy are...... Respectively
A. Angular momentum $\frac{h}{2 \pi}$ energy $=\frac{-9 \pi^{2} e^{4} m}{2 h^{2}}$
B. Angular momentum $\frac{3 h}{2 \pi}$ energy $=\frac{+3 \pi^{2} e m^{4}}{4 h^{2}}$
C. Angular momentum $\frac{h}{2 \pi}$ energy $=\frac{3 \pi^{2} m e^{4}}{2 h^{2}}$
D. Angular momentum $\frac{h}{2 \pi}$ energy $=\frac{-6 \pi^{2} e^{4} m}{3 h^{2}}$

## Answer: A

## D Watch Video Solution

10. In long form of periodic table, an elem ent has electronic configuration $I s^{2} 2 s^{22} p^{6} 3 s^{2} 3 p^{3}$ Thus what
will be the atomic no. of elem ent ? Which is just below this elem ent in its group ?
A. 23
B. 16
C. 47
D. 33

## Answer: D

## - Watch Video Solution

11. The decrease in number of neutrons when ${ }_{.}^{x} U$
changes the.${ }_{b}^{y} \mathrm{~Pb}$ is represented as :
A. $(x-a)+(y+b)$
B. $(x-a)-(y+b)$
C. $(x+a)-(y-b)$

## D. $(x-a)-(y-b)$

Answer: D

## - Watch Video Solution

12. The correct relationship betw een quantum numbers $\mathrm{n}, \mathrm{l}$ and m is :
A. $n<l<m$
B. $n<l \leq m$
C. $n>l \geq, \mathbf{m}$
D. $n \geq l>m$

Answer: C

## D Watch Video Solution

13. If there are 13 electrons in $M$ shell and 1 electron in
$N$ shell th en the num ber of unpaired electrons in such atom will be.....
A. 5
B. 4
C. 3
D. 6
14. Which element of the following not possesses half
filled valence shell with electron?
A. C
B. 0
C. Ne
D. N

Answer: A

- Watch Video Solution

15. The num ber of protons in nucleus of an elem ent having maximum unpaired electrons in $2 p$ sub-shell are
A. 7
B. 5
C. 14
D. 6

Answer: A

- Watch Video Solution

16. How $m$ any orbitals are a sso cia ted $w$ ith $n=4$ ?
A. 16
B. 15
C. 8
D. 18

Answer: A

## D Watch Video Solution

17. What is wavelength of wave associated with electron whose velocity $(\mathrm{v})$ is $10^{8} \mathrm{~cm} \mathrm{sec}^{-1}$ ?
A. 7.27 nm
B. $7.27 \times 10^{-8}$
m
C. $7.27 \times 10^{-10} \mathrm{~m}$
D. $7.27 \times 10^{-10} \mathbf{A}$

## Answer: C

## D Watch Video Solution

18. The product of frequencyof light and wavelength is
equal to .....
A. Redberg's constant
B. Plank.s constant
C. Energy of photon
D. Velocity of light

## Answer: D

## D Watch Video Solution

19. Which of the following electronic configuration is $\mathbf{n}$
ot possible ?
A. $3 d^{2}$
B. $2 p^{2}$
C. $3 f^{2}$
D. $4 s^{2}$

Answer: C

# 20. Spin $m$ ultiplicity value of oxygen element is 

A. 2
B. 1.5
C. 1
D. 4

Answer: C

- Watch Video Solution

21. How $m$ any number of proton, electron and neutron n in.${ }^{55} \mathrm{Mn} n^{+2}$ respectively ?
A. $\mathbf{2 5 , 2 7 , 3 0}$
B. $\mathbf{2 5 , 2 5 , 3 0}$
C. $25,23,30$
D. 25,27,26

Answer: C

D Watch Video Solution
22. Which of the following is the correct form ula for one $m$ ole of $p h$ o to $n$ energy ?
A. $\frac{N h}{\lambda c}$
B. $\frac{h c}{\lambda}$
C. $\frac{N h c}{\lambda}$
D. $\frac{N c}{\lambda}$

Answer: C

- Watch Video Solution

23. The correct electronic configuration of ${ }_{29} \mathrm{Cu}^{2+}$ is
A. $[A r] 4 s^{1} 3 d^{10}$
B. $[A r] 4 s^{2} 3 d^{8}$
C. $[A r] 4 s^{2} 3 d^{9}$
D. $[A r] 4 s^{0} 3 d^{9}$

## Answer: D

## D Watch Video Solution

24. From the following $w$ hich pair is isotone and isobar respectively.
A. iii and I

## B. I and ii

## C. I and iii

D. iii and iv

Answer: A

D View Text Solution
25. Which of thefollowing represents the correct set of four quantum number of 3d orbital electron ?
A. $n=3, l=3, m=2, s=+\frac{1}{2}$
B. $n=3, l=2, m=2, s=0$
C. $n=3, l=2, m=1, s=+\frac{1}{2}$
D. $n=4, l=2, m=2, s=0$

## Answer: C

## D Watch Video Solution

26. What are the possible values of I when $\mathrm{n}=4$
A. 0,1,2,3
B. 1,2,3,4
C. 0,1,2,3
D. 4,0,2,3

Answer: A
27. Give num ber of protons, electrons and neutrons respectively in.$_{16}^{32} S^{2-}$
A. 16,16,16
B. 16,14,16
C. 16,16,14
D. 16,16,18

Answer: D

- Watch Video Solution

28. According to De-Brogli's principal, what is the relation between momentum and $\mathbf{w}$ avelength of $m$ ovable particals
A. inverse proportion
B. underroot proportion
C. same proporotion
D. none of these

Answer: A

- Watch Video Solution


## 29. Electron configuration of $M$ olybdenum $(Z=42)$ is

A. $[K r] 4 d^{4} 5 s^{2}$
B. $[K r] 5 s^{2} 4 p^{4}$
C. $[K r] 4 d^{5} 5 s^{1}$
D. $[K r] 4 d^{3} 5 s^{2} s p^{-1}$

Answer: C

D Watch Video Solution
30. Give actual proportion energy having wavelength of 3000A and 6000A respectively.
A. 2:1
B. 1: 3
C. 3:1
D. 1:2

Answer: A

- Watch Video Solution

31. Identify the possible set of quantum numbers for outer shell electron in element $K$.

$$
\begin{aligned}
& \text { A. } n=4, l=0, m=0, s= \pm \frac{1}{2} \\
& \text { B. } n=4, l=1, m=1, s= \pm \frac{1}{2} \\
& \text { C. } n=3, l=2, m=-1, s= \pm \frac{1}{2} \\
& \text { D. } n=3, l=0, m=0, s= \pm \frac{1}{2}
\end{aligned}
$$

Answer: A

D Watch Video Solution
32. In Schrodinger's wave equation V indicates
A. wave function

# B. total enthalpy of electron and proton 

C. velocity of electrone
D. potential energy

## Answer: D

## D Watch Video Solution

33. How many 'nodes' are there in 3s orbital ?
A. 3
B. 2
C. 1
D. zero

Answer: B

- Watch Video Solution

34. Two electrons of $K$-shell can be distinguished by
A. spin quantum number.
B. azimuthal quantum number.
C. principal quantum number
D. magnetic quantum number

Answer: A

## D Watch Video Solution

35. In an atom an electron is moving with a speed of $600 \mathrm{~ms}^{-1}$ with an accuracy of $0.005 \%$ certain ty w ith w hich the $p$ osition of the electron can be located is....
A. $5.10 \times 10^{-3} \mathbf{m}$
B. $3.84 x 10^{-3} \mathrm{~m}$
C. $1.92 \times 10^{-3} \mathbf{m}$
D. $1.52 \times 10^{-4} \mathbf{m}$

Answer: C
36. The splitting of the spectral lines under the influence of magnetic field is called....
A. photoelectric effect
B. Zeeman effec
C. diffraction
D. interference

Answer: B
37. Bohr's atomic model could explain the spectrum of
A. Atoms or ions which have two electrons.
B. Only dihydrogen molecule.
C. $H e^{-}$atom only.
D. Atoms or ions which contain only one electron

## Answer: D

## D Watch Video Solution

38. How many electrons in an atom with atomic number 50 can have $(n+I)=5$ ?
A. 10
B. 12
C. 18
D. 25

## Answer: C

## D Watch Video Solution

39. Which of the following set of quantum numbers of an electron will have the highest energy

|  | n | 1 | m | s |
| :--- | :---: | :---: | :---: | :---: |
| (A) | 4 | 2 | -1 | $-\frac{1}{2}$ |
| (B) | 3 | 2 | 1 | $-\frac{1}{2}$ |
| (C) | 5 | 0 | 0 | $-\frac{1}{2}$ |
| (D) | 4 | 1 | 0 | $-\frac{1}{2}$ |

D Watch Video Solution
40. The associate wavelength of a particle with mass 1
gram and velocity $100 \mathrm{~m} / \mathrm{s}$ is
A. $6.63 \times 10^{-35} \mathrm{~m}$
B. $6.63 \times 10^{-36} \mathrm{~m}$
C. $6.626 \times 10^{-33} \mathrm{~m}$

$$
\text { D. } 6.626 \times 10^{-34} \mathbf{m}
$$

## Answer: C

## D Watch Video Solution

41. When electron enters into the orbital of equal energy subshells, they are arranged in such a way that the direction of their spins remain parallel or the value of spin quantum number remains maximum. This statement is known as...
A. Hund's rule
B. Heisenberg's principle

## C. Pauli's Exclusion principle

D. Auf-bau rule

Answer: A

- Watch Video Solution

42. Assertion : The relative proportion of atoms of

THtium and Protium is $1: 10^{17}$
Reason : The property responsible for the low proportion of Tritium is its non-radioactivity.
A. Assertion is false but reason is true
B. Assertion is true but reason is false

## C. Both assertion and reason are true

D. Both assertion and reason are true and reason is
the correct explanation of the assertion.

Answer: B

## D Watch Video Solution

43. If kinetic energy of an electron is increased by nine
times, the wavelength associated with it would become
A. $\frac{1}{3}$ times
B. $\frac{1}{9}$ times

## C. 9 times

D. 3 times

Answer: A

## D Watch Video Solution

44. The correct set of four quantum number for the unpaired electron of the element $Z=21$ is
A. $n=3, l=2 m=1 s=+\frac{1}{2}$
B. $n=3, l=1 m=0 s=+\frac{1}{2}$
C. $n=3, l=3 m=2 s=+\frac{1}{2}$
D. $n=4, l=0 m=0 s=+\frac{1}{2}$

## - Watch Video Solution

45. What is frequency of first line of Balmer series for H-atom ?
A. $3.29 \times 10^{15} s^{-1}$
B. $8.05 \times 10^{13} s^{-1}$
C. $8.22 \times 10^{15} s^{-1}$
D. $4.57 \times 10^{14} s^{-1}$

Answer: D
46. Number of unpaired electron(s) present in an element having atom ic num ber $Z=24$ is .........
A. 6
B. 4
C. 0
D. 5

Answer: A
(D) Watch Video Solution
47. Number of total electrons in an orbit of - angular M omentum Quantum Number ( I ) is ........
A. $l^{2}$
B. $41+2$
C. $21+1$
D. $\mathbf{2 l + 2}$

Answer: B

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48. Number of electrons present in $P^{-3}$ ion having 15
protons are......
A. 15
B. 16
C. 18
D. 12

Answer: C

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49. Which of the following electronic configuration is not possible
A. $4 d^{8}$
B. $3 f^{14}$
C. $3 s^{1}$
D. $2 p^{6}$

Answer: B

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50. What is shape of theorbital having $I=I$ and $m=0$ ?

# A. Triangular plana 

B. Dumbbel
C. Square plana
D. Spherical

Answer: B

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51. Electronic configuration of an elem ent of the $m$ odern periodic table is ............ $I s^{2} 2 s^{2} 2 p^{6} 3 s^{2} 3 p^{4}$ What
will be atomic number of the element immediately below it, in the same group?
A. 18
B. 34
C. 48
D. 24

Answer: B

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52. Which of the following series of lines in atomic spectrum of hydrogen appear in visible region?

A. paschen

B. balmer

## C. brackett

D. Iyman

## Answer: B

## D Watch Video Solution

53. The energy of one mole of photon having frequency $4 \times 10^{14} \mathrm{~Hz}$ is
A. $129 \mathrm{kjmol}^{-1}$
B. $159 \mathrm{kjmol}^{-1}$
C. $145 \mathrm{kjmol}^{-1}$
D. $212 \mathrm{kjmol}^{-1}$

## Answer: B

## D Watch Video Solution

## Section D Multiple Choice Questions

1. Which of the following conclusions could not be derived from Rutherford's a-particle scattering experiement?
A. Most of the space in the atom is empty.
B. The radius of the atom is about $10^{-10} \mathrm{~m}$ while that of nucleus is $10^{-15} \mathrm{~m}$.

# C. Electrons move in a circular path of fixed energy 

called orbits.
D. Electrons and the nucleus are held together by electrostatic forces of attraction.

## Answer:

## - Watch Video Solution

2. Which of the following options does not represent ground state electronic configuration of an atom ?
A. $I s^{2} 2 s^{2} 2 p^{6} 3 s^{2} 3 p^{6} 3 d^{8} 4 s^{2}$
B. $I s^{2} 2 s^{2} 2 p^{6} 3 s^{2} 3 p^{6} 3 d^{9} 4 s^{2}$
C. $I s^{2} 2 s^{2} 2 p^{6} 3 s^{2} 3 P^{6} 3 d^{10} 4 s^{1}$
D. $I s^{2} 2 s^{2} 2 p^{6} 3 s^{2} 3 p^{6} 3 d^{5} 4 s^{1}$

## Answer:

D Watch Video Solution
3. The probability density plots of Is and 2 s orbitals are
given in


15 orbital

The density of dots in a region represents the probability density of finding electrons in the region. On the basis of above diagram which of the following statements is incorrect
A. Is and 2 s orbitals are spherical in shape.
B. Is and 2 s orbitals are spherical in shape.
C. The probability of finding the electron at a given
distance is equal in all directions
D. The probability density of electrons for 2 s orbital decreases uniformly as distance from the nucleus increases.
4. Which of the following statement is not correct about the characteristics of cathode rays
A. They start from the cathode and move towards the anode.

# B. They travel in straight line in the absence of an 

 external electrical or magnetic field.C. Characteristics of cathode rays do not depend upon the material of electrodes in cathode ray tub

## D. Characteristics of cathode rays depend upon the

nature of gas present in the cathode ray tube.

## Answer:

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5. Which of the following statements about the electron is incorrect ?
A. It is a negatively charged particle.
B. The mass of electron is equal to the mass of neutron
C. It is a basic constituent of all atoms

## D. It is a constituent of cathode rays.

## Answer:

## D Watch Video Solution

6. Which of the following properties of atom could be explained correctly by Thomson Model of atom
A. Overall neutrality of atom.
B. Spectra of hydrogen atom.
C. Position of electrons, protons and neutrons in atom.
D. Stability of atom.

## Answer:

## D Watch Video Solution

7. Two atoms are said to be isobars if....
A. they have same atomic number but different mass number.
B. they have same number of electrons but different number of neutrons.
C. they have same number of neutrons but different number of electrons.

# D. sum of the number of protons and neutrons is 

## same but the number of protons is different

## Answer:

## D Watch Video Solution

## 8. The number of radial nodes for $3 p$ orbital is...

A. 3
B. 4
C. 2
D. 1

## Answer:

## - Watch Video Solution

9. Number of angular nodes for 4d orbital is..
A. 4
B. 3
C. 2
D. 1

## Answer:

10. Which of the following is responsible to rule out the existence of definite paths or trajectories of electrons
A. Pauli's exclusion principle.
B. Heisenberg's uncertainty principle.
C. Hund's rule of maximum multiplicity.
D. Aufbau principle

## Answer:

# 11. Total number of orbitals associated with third shell 

## will be.......

A. 2
B. 4
C. 9
D. 3

Answer:

- Watch Video Solution

12. Orbital angular momentum depends on ....
A. 1

## B. $n$ and I

C. $n$ and m
D. $m$ and $s$

## Answer:

## D Watch Video Solution

13. Chlorine exists in two isotopic forms, $\mathrm{Cl}-37$ and $\mathrm{Cl}-$

35 but its atomic mass is 35.5 . This indicates the ratio
of $\mathrm{Cl}-37$ and $\mathrm{Cl}-35$ is approximately
A. $1: 2$
B. 1:1
C. 1:3
D. 3:1

## Answer:

## - Watch Video Solution

14. The pair of ions configuration is ....
A. $\mathrm{Cr}^{3+}, \mathrm{Fe}^{3+}$
B. $F e^{3+}, M n^{2}$
C. $\mathrm{Fe}^{3+}, \mathrm{Co}^{3+}$
D. $S c^{3+}, C r^{3+}$

## Answer:

## D Watch Video Solution

15. For the electrons of oxygen atom, which of the following statements is correct ?
A. $Z_{\text {eff }}$ for an electron in a 2 s orbital is the same as
$Z_{e f f}$ for an electron in a 2 p orbital.
B. An electron in the 2 s orbital has the same energy
as an electron in the 2 p orbital
C. $Z_{\text {eff }}$ for an electron in Is orbital is the same as
$Z_{e f f}$ for an electron in a 2 s orbital.
D. The two electrons present in the 2 s orbital have spin quantum numbers $m_{s}$ but of opposite sign.

## Answer:

## - Watch Video Solution

16. If travelling at same speeds, which of the following matter waves have the shortest wavelength ?

A. Electron

B. Alpha particle $\left(H e^{2+}\right)$

## C. Neutron

## D. Proton

## Answer:

## - Watch Video Solution

17. Identify the pairs which are not of isotopes
A. ${ }_{6}^{12} X,{ }_{6}^{13} X$
B. ${ }_{17}^{35} X,{ }_{17}^{37} X$
C. ${ }_{6}^{14} X,{ }_{7}^{14} X$
D. ${ }_{4}^{8} X, .{ }_{5}^{8} X$

## Answer:

## D Watch Video Solution

18. Out of the following pairs of electrons, identify the pairs of electrons present in degenerate orbitals :
A. $(i) n=3, I=2, m_{l}=-2, m_{s}=-\frac{1}{2}$
(ii) $n=3,1=2 m_{l}=-1, m_{s}=-\frac{1}{2}$
B. $(i) n=3, I=2, m_{l}=1, m_{s}=+\frac{1}{2}$
(ii) $n=3,1=2 m_{l}=1, m_{s}=+\frac{1}{2}$
C. $(i) n=4, I=2, m_{l}=1, m_{s}=+\frac{1}{2}$
(ii) $n=3,1=2 m_{l}=1, m_{s}=+\frac{1}{2}$
D. $(i) n=3, I=3, m_{l}=+2, m_{s}=+\frac{1}{2}$
(ii) $n=3,1=2 m_{l}=+2, m_{s}=+\frac{1}{2}$

## Answer:

## D Watch Video Solution

19. Which of the following sets of quantum numbers are correct ?

A. $11+2$

B. $21+1$
C. 3-2
D. 34-2

## Answer:

## D Watch Video Solution

20. In which of the following pairs, the ions are iso electro n ic ?
A. $N a^{+}, M g^{2+}$
B. $\mathrm{Al}^{3+}, \mathrm{O}^{-}$
C. $N a^{+}, O^{2-}$
D. $\mathrm{N}^{3-}, \mathrm{Cl}^{-}$

Answer:
21. Which of the following statements concerning the quantum numbers are correct ?
A. Angular quantum num ber determ ines the three
dim ensional shape of the orbital.
B. The principal quantum num ber determ ines the
orientation and energy of the orbital.
C. $M$ agnetic quantum num ber determ ines the size of the orbital
D. Spin quantumnumber of an lectron
determ ines the orientation of the spin of
electron relative to the chosen axis.

## Answer:

## D Watch Video Solution

22. Arrange $s, p$ an $d$ subshells of a shell in the increasing order of effective nuclear charge $\left(Z_{\text {eff }}\right)$ experienced by the electron present in them .

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23. Show the distribution of electrons in oxygen atom
(atom ic num ber 8) using orbital diagram .
24. Nickel atom can lose two electrons to form $N i^{2+}$ ion. The atomic number of nickel is $\mathbf{2 8}$. From which orb ital will nickel lose two electrons.

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25. Which of the following orbitals are degenerate ?
$3 d_{x y}, 4 d_{x y}, 3 d_{z^{2}}, 3 d_{y z}, 4 d_{y z}, 4 d_{z^{2}}$
26. Calculate the total number of angular nodes and radial nodes present in 3p orbital.

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27. The arrangemen $t$ of orbitals on the basis of energy is based upon th eir $(n+I)$ value. Lower the value of $(n$
+1 ), low er is the energy. For orb itals $h$ aving sam e
values of $(\mathrm{n}+\mathrm{l})$, th e orb ital with low er value of n
will have lower energy. (I) Based upon the above inform ation, arrange the fo llowingorbita ls in th e in creas in g order of energy. (a) $1 \mathrm{~s}, 2 \mathrm{~s}, 3 \mathrm{~s}, 2 \mathrm{p}$ (b) 4 s ,

3s, 3p, 4d (c) 5p, 4d, 5d, 4f, 6s (d) 5f, 6d, 7s, 7p (II) Based
upon the above inform ation, solve the questions given below : (a) Which of the following orbitals has the lowest energy ? 4d, 4f, 5s, 5p (b) W hich of the following orbitals has the highest energy ? 5p, 5d, 5 f, 6s, 6p

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28. Which of the following will not show deflection
from the path on passing through an electric field ?
Proton, C athode rays, E lectron, N eutron
29. An atom having atom ic $m$ ass num ber 13 has 7 neutrons. W hat is the atom ic numb er of the atom ?

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30. Wavelengths of different rad iatio n s are given below
$\lambda(A)-300 n m \lambda(B)=300 \mu m \lambda(C)=3 n m \lambda(D)=30 A$
Arrange the seradiations in th eincreasing order of their energies.
31. Show the distribution of electrons in oxygen atom
(atom ic num ber 8) using orbital diagram .

## D Watch Video Solution

32. The Balm er series in the hydrogen sp ectru m corresponds to the transition from $n_{1}=2$ to $n_{2}=\mathbf{3}$,

4,.......This series lies in th e visible region. Calculate the
wave num ber of line associated with the tran sitio $\mathbf{n}$ in
Balm er series $\mathbf{w}$ hen the electron m oves to $\mathrm{n}=4$ orbit.
$\left(R_{H}=109677 \mathrm{~cm}^{-1}\right)$

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33. According to de Broglie, matter should exhibit dual behaviour, that is both particle and wave like properties. However, a cricket ball of mass 100 g does not move like a wave when it is thrown by a bowler at a speed of $100 \mathrm{~km} / \mathrm{h}$. Calculate the w avelength of the ball and explain why it does not show wave nature.

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34. What is the experimental evidence in support of
the idea that electronic energies in an atom are quantized ?
35. Out of electron and proton which one will have, a higher velocity to produce $m$ atter waves of the same wavelength ? Explain it.

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36. A hypothetical electromagnetic wave is shown in

Figure. Find out the wavelength of the radiation.

37. Chlorophyll present in green leaves of plants absorbs light at $4.620 \times 10^{14} \mathrm{~Hz}$. Calculate the wavelength of radiation in nanometer. Which part of the electromagnetic spectrum does it belong to ?

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38. What is the difference between the terms orbit and orbital ?
39. Table-tennis ball has a mass 10 g and a speed of 90
$\mathrm{m} / \mathrm{s}$. If speed can be measured within an accuracy of
4\% what will be the uncertainty in speed and position

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40. The effect of uncertainty principle is significant only for motion of microscopic particles and is negligible for the macroscopic particles. Justify the statement with the help of a suitable example.
41. Hydrogen atom has only one electron, so mutual repulsion between electrons is absent. However, in multielectron atoms mutual repulsion between the electrons is significant. How does this affect the energy of an electron in the orbitals of the same principal quantum number in multielectron atoms?

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42. Match the following species with their corresponding ground state electronic configuration.

| Atom / Ion | Electronic configuration |
| :--- | :--- |
| (i) Cu | (a) $1 s^{2} 2 s^{2} 2 \mathrm{p}^{6} 3 s^{2} 3 \mathrm{p}^{6} 3 \mathrm{~d}^{10}$ |
| (ii) $\mathrm{Cu}^{2+}$ | (b) $1 s^{2} 2 s^{2} 2 \mathrm{p}^{6} 3 s^{2} 3 d^{10} 4 s^{2}$ |
| (iii) $\mathrm{Zn}^{2+}$ | (c) $1 s^{2} 2 s^{2} 2 \mathrm{p}^{6} 3 s^{2} 3 \mathrm{p}^{6} 3 \mathrm{~d}^{10} 4 s^{1}$ |
| (iv) $\mathrm{Cr}^{3+}$ | (d) $1 s^{2} 2 s^{2} 2 \mathrm{p}^{6} 3 s^{2} 3 p^{6} 3 d^{9}$ |
|  | (e) $1 s^{2} 2 s^{2} 2 \mathrm{p}^{6} 3 s^{2} 3 \mathrm{p}^{6} 3 \mathrm{~d}^{3}$ |

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## 43. Match the quantum numbers with the information

## provided by these

| Quantum number | Information provided |
| :--- | :--- |
| (i) Principal quantum number | (a) orientation of the orbital |
| (ii) Azimuthal quantum number | (b) energy and size of orbital |
| (iii) Magnetic quantum number | (c) spin of electron |
| (iv) Spin quantum number | (d) shape of the orbital |

## 44. Match the following rules with their statements

| Rules | Statements |
| :--- | :--- |
| (i) Hund's Rule | (a) No two electrons in an atom can have the same set of four <br> quantum numbers. |
| (ii) Aufbau Principle | (b) Half-filled and completely filled orbitals have extra stablity. <br> (iii) Pauli Exclusion Principle <br> (c) Pairing of electrons in the orbitals belonging to the same <br> subshell does not take place until each orbital is singly <br> occupied. |
| (iv) Heisenberg's Uncertainty | (d) It is impossible to determine the exact position and exact <br> momentum of a subatomic particle simultaneously. <br> Principle |
| (e) In the ground state of atoms, orbitals are filled in the order of <br> their increasing energies. |  |

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## 45. Match the following

| (i) X-rays | (a) $v=10^{0}-10^{4} \mathrm{~Hz}$ |
| :--- | :--- |
| (ii) UV | (b) $v=10^{10} \mathrm{~Hz}$ |
| (iii) Long radio waves | (c) $v^{\prime}=10^{16} \mathrm{~Hz}$ |
| (iv) Microwave | (d) $v=10^{18} \mathrm{~Hz}$ |

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## 46. Match the following

| (i) | Photon |
| :--- | :--- |
| (ii) | Electron |
| (iii) $v^{2}$ | (a) Value is 4 for N shell |
| (iv)Probability density <br> number $n$ | (c) Always positive value |
|  | (d) Exhibits both |
| momentum and |  |
| wavelength |  |

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## 47. Match species given in Column-I with the electronic

configuration given in Column-II

| Column-I | Column-II |
| :--- | :--- |
| (i) Cr | (a) $\mid \mathrm{Ar}] 3 d^{81} 4 s^{0}$ |
| (iii) $\mathrm{Fe}^{2+}$ | (b) $\left[\mathrm{Ar} \mid 3 d^{10} 4 s^{1}\right.$ |
| (iii) $\mathrm{Ni}^{2+}$ | (c) $\left[\mathrm{Ar} \mid 3 d^{6} 4 \mathrm{~s}^{0}\right.$ |
| (iv) Cu | (d) $[\mathrm{Ar}] 3 d^{5} 4 s^{1}$ |
|  | (e) $[\mathrm{Ar}] 3 d^{6} 4 \mathrm{~s}^{2}$ |

A. Both $A$ and $R$ are true and $R$ is the correct explanation of $A$.

B. Both $A$ and $R$ are true but $R$ is not the correct explanation of $A$.

C. $A$ is true but $R$ is false.
D. Both $A$ and $R$ are false.
48. Assertion (A) : All isotopes of a given element show the same type of chemical behaviour. Reason (R) : The chemical properties of an atom are controlled by the number of electrons in the atom.
A. Both $A$ and $R$ are true and $R$ is the correct explanation of $A$.
B. Both $A$ and $R$ are true but $R$ is not the explanation of A .
C. $A$ is true and $R$ is false
D. Both $A$ and $R$ are false

## Answer:

## D Watch Video Solution

49. Assertion (A) : Black body is an ideal body that emits and absorbs radiations of all frequencies.

Reason (R) : The frequency of radiation emitted by a body goes from a lower frequency to higher frequency with an increase in temperature.
A. Both $A$ and $R$ are true and $R$ is the correct
explanation of $A$.
B. Both $A$ and $R$ are true and $R$ is not the correct
explanation of A .
C. $A$ is true and $R$ is false.
D. Both $A$ and $R$ are false.

## Answer:

## D Watch Video Solution

50. Assertion (A) : It is impossible to determine the exact position and exact momentum of an electron simultaneously. Reason (R) : The path of an electron in an atom is clearly defined
51. What is photoelectric effect? State the result of photoelectric effect experiment that could not be explained on the basis of laws of classical physics.

Explain this effect on the basis of quantum theory of electromagnetic radiations.

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52. Threshold frequency, $v_{0}$ is the minimum frequency
which a photon must possess to eject an electron
from a metal. It is different for different metals. When
a photon of frequency $1.0 \times 10^{15} \mathrm{~s}^{-1}$ was allowed to
hit a metal surface, an electron having $1.988 \times 10^{-19} \mathrm{~J}$
of kinetic energy was emitted. Calculate the threshold frequency of this metal. Show that an electron will not be emitted if a photon with a wavelength equal to 600 nm hits the metal surface.

## D Watch Video Solution

53. When an electric discharge is passed through hydrogen gas, the hydrogen $m$ olecu les dissociate to produce excited hydrogen atoms. These excited atom s em it electrom agnetic radiation of discrete frequencies which can be given by the general formula

What points of Bohr's model of an atom can be used to arrive at this formula ? Based on these p 0 in ts
derive the above form ula giving description of each step and each term.

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54. Calculate radiation from $n=3 t o n=2 i n a$ hydrogen atom.

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55. Why was a change in the Bohr Model of atom required ? Due to which important development (s), concept of movement of an electron in an orbit was
replaced by, the concept of probability of finding
electron in an orbital ? What is the name given to the changed model of atom ?

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## Questins Paper From Module Section A

1. One bivalent ion has electron configuration $2,8,8,6$,
its atomic mass is 56 . Calculate the number of neutron in it.

## 2. Which electromagnetic radiation has highest wave

 length ?
## D Watch Video Solution

3. What is indicated by magnetic Quantum number ?

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4. The metal with atomic number $20,23,37,55$ given.

Which show photoelectric effect most easily
5. State spin multiplicity of valence electron of Nitrogen atom.

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6. State all four quantum number for 37 th electron of

Cs.

- Watch Video Solution

Questins Paper From Module Section B

1. Calculate the mass of photon having 3.6A wavelength. ( $\mathrm{h}=\mathbf{6 . 6 2 6} \times 10 \sim 34 \mathrm{Is}, \mathrm{V}=3 \times 108 \mathrm{~ms}{ }^{\prime \prime} 1$ )

## D Watch Video Solution

## 2. Explain Pauli's rule with example.

## D Watch Video Solution

3. Write electron configuration of $S(Z=16)$ and spin multiplicities.

## Questins Paper From Module Section C

1. Calculate frequency and wave length of photon during the transition of electron in hydrogen from $\mathbf{n}=$ 6 to $\mathbf{n}=2$ orbit.

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2. Give observation and conclusion of Rutherford's scattering experiment. <br> Watch Video Solution}
3. Explain Heisenberg's uncertainty principle.

- Watch Video Solution


## 2. Explain different types of Quantum Numbers.

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