CHEMISTRY

BOOKS - NARENDRA AWASTHI

ATOMIC STUCTURE

Exercise

1. Which of the following pair is isodiaphers?

A. C_6^{14} and Na_{11}^{23}

B. Mg_{12}^{24} and Na_{11}^{23}

C. He_2^4 and O_8^{16}

D. C_6^{12} and N_7^{15}

Answer:

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2. Which of the following does not characterise X-rays?

A. The radiation can ionise the gas

B. It causes fluorescence effect on Zns

C. It is deflected by electric and magnetic fields

D. Its wavelength is shorter than ultraviolet rays

Answer:

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3. The ratio of specific charge of a proton and an alpha-particle is :

A. $2:1$

B. $1:2$

C. $1:4$

D. $1:1$

Answer:

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4. The increasing order (lowest first) for the values of e/m (charge//mass) for electron (e), proton (p), neutron (n), and alpha particle (α) is

A. e,p,n,α

B. n,p,e,α

C. n,p,α,e

D. n,α,p,e

Answer:

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5. The mass to charge ratio (m/e) for a cation is $1.5 \times 10^{-8}\ kg/C$. What is the mass of this cation?

A. 2.4×10^{-19} g

B. 2.4×10^{-27} g

C. 2.4×10^{-24}g

D. None of these

Answer:

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6. Rutherford's experiment on the scattering of α particle showed for the first time that the atom has

A. electrons

B. protons

C. nucleus

D. neutrons

Answer:

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7. Describe the orbital with the quantum number : n = 1 l = 0

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8. Calculate the wavelength of an electron moving with a velocity of 2.05×10 7 ms −1

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9. PCl5 molecule has following geometry:

A. trigonal bipyramiidal

B. octahedral

C. square planer

D. tetrahedral

Answer:

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10. The number of types of bonds between two carbon atom in calcium carbide is :

A. 1 sigma , 1 pi

B. 2 sigma , 1 pi

C. 2 sigma , 2 pi

D. 1 sigma , 2 pi

Answer:

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11. In the structure of ClF3 , the number of lone pairs of electrons on central Cl atom is :

A. 1

B. 2

C. 3

D. 4

Answer:

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12. For any H like system, the ratio of velocities of electron in I, II & III orbit e.e.,$V_1 : V_2 : V_3$ will be:

A. $1 : 2 : 3$

B. $1 : 1/2 : 1/3$

C. $3:2:1$

D. $1:1:1$

Answer:

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13. The volume of nucleus is about :

A. 10^{-4} times to that of an atom

B. 10^{-15} times to that of an atom

C. 10^{-5} times to that of an atom

D. 10^{-10} times to that of an atom

Answer:

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14. An electron in an atom jumps in such a way that its kinetic energy changes from x to $\frac{x}{4}$. The change in potential energy will be:

A. $+\frac{3}{2}x$

B. $-\frac{3}{8}x$

C. $+\frac{3}{4}x$

D. $-\frac{3}{4}x$

Answer:

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15. The potential energy of an electron in the hydrogen atom is -6.8 eV. Indicate in which excited state, the electron is present?

A. first

B. second

C. third

D. fourth

Answer:

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16. What is the potential energy of an electron present in $N-$ shell of the Be^{3+} ion ?

A. $-3.4eV$

B. $-6.8eV$

C. $-13.6eV$

D. $-27.2eV$

Answer:

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17. The kinetic and potential energy (in eV) of electron present in third Bohr's orbit of hydrogen atom are respectively :

A. $-1.51,\ -3.02$

B. $1.51,\ -3.02$

C. $-3.02, 1.51$

D. $1.51,\ -1.51$

Answer:

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18. The distance between $4th$ and $3rd$ Bohr orbits of He^+ is :

A. 2.645×10^{-10}m

B. 1.322×10^{-10}m

C. 1.851×10^{-10}m

D. None of these

Answer:

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19. What do you mean by single covalent bond?

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20. The ratio of velocity of the electron in the third and fifth orbit of Li^{2+} would be :

A. $3:5$

B. $5:3$

C. $25:9$

D. $9:25$

Answer:

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21. If radius of second stationary orbit (in Bohr's atom) is R then radius of third orbit will be :

A. $R/3$

B. $9R$

C. $R/9$

D. $2.25R$

Answer:

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22. Which state of the triply ionized Beryllium $\left(Be^{3+}\right)$ has the same orbit radius as that of the ground state of hydrogen atom?

A. 3

B. 2

C. 4

D. 5

Answer:

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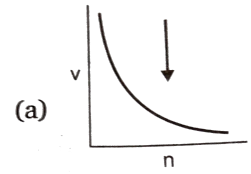
23. Select the incorrect graph for velocity of e^- in an orbit vs. Z, $\frac{1}{n}$ and n :

A.



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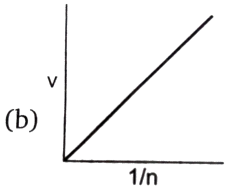

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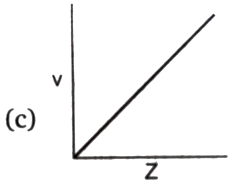

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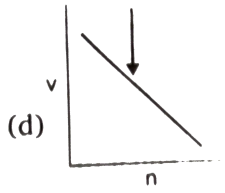

Answer:

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24. What is the frequency of revolution of electron present in $2nd$ Bohr's orbit of $H-$ atom ?

A. $1.016 \times 10^{16} s^{-1}$

B. $4.065 \times 10^{16} s^{-1}$

C. $1.626 \times 10^{15} s^{-1}$

D. $8.2 \times 10^{14} s^{-1}$

Answer:

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25. According to Bohr's atomic theory, which of the following is correct ?

A. Potential energy of electron $\propto \frac{Z^2}{n^2}$

B. The product of velocity of electron and principal quantum number (n) $\propto -Z^2$

C. Frequency fo revolution of electron in an orbit $\propto \frac{Z^2}{n^3}$

D. Coulombic force of attraction on the electron $\propto \frac{Z^2}{n^2}$

Answer:

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26. Number of waves produced by an electron in one complete revolution in n^{th} orbit is :

A. n

B. n^2

C. $(n+1)$

D. $(2n + 1)$

Answer:

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27. Which of the following statement does not form part of Bohr's model of the hydrogen atom?

A. Energy of the electrons in the orbit is quantized

B. The electron in the orbit which is nearest to the nucleus has the lowest energy

C. Electrons revolve in different orbits around the nucleus

D. The position and velocity of the electrons in the orbit cannot be detemined simulatneously

Answer:

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28. What is the separation energy (in eV) for Be^{3+} in the first excited state ?

A. 13.6 eV

B. 27.2 eV

C. 40.8 eV

D. 54.5 eV

Answer:

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29. If in Bohr's model, for unielectronic atom, time period of revolution is represented as $T_{n,z}$ where n represents shell no. and Z represents atomic number then the value of $T_{1,2} : T_{2,1}$, will be :

A. $8 : 1$

B. $1:8$

C. $1:1$

D. $1:32$

Answer:

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30. Which of the following is discreted in Bohr's theory?

A. Potential energy

B. Kinetic energy

C. velocity

D. Angular momentum

Answer:

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31. What is the ratio of time periods (T_1/T_2) in second orbit of hydrogen atom to third orbit of He^+ ion?

A. $8/27$

B. $32/27$

C. $27/32$

D. None of these

Answer:

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32. The mass of an electron is m, charge is e and it is accelerated form rest through a potential difference of V volts. The velocity acquired by electron will be :

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

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

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

D. zero

Answer:

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33. If the ionization energy of He^+ is $19.6 \times 10^{-18} J$ per atom then the energy of Be^{3+} ion in the second stationary state is :

A. $-4.9 \times 10^{-18} J$

B. $-44.1 \times 10^{-18} J$

C. $-11.025 \times 10^{-18} J$

D. $-19.6 \times 10^{-18} J$

Answer:

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34. The energy of the second Bohr orbit in the hydrogen atom is $-3.41eV$. The energy of the second Bohr orbit of He^+ ion would be :

A. -0.85 eV

B. -13.64 eV

C. -1.70 eV

D. -6.82 eV

Answer:

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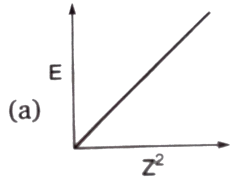
35. The energy of an electron moving in n^{th} Bohr's orbit of an element is given by $E_n = \frac{-13.6}{n^2} Z^2$ eV/ atom (Z=atomic number). The graph of E vs. Z^2 (keeping "n" constant) will be :

A.



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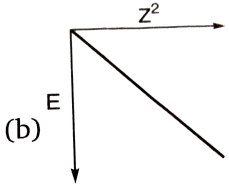

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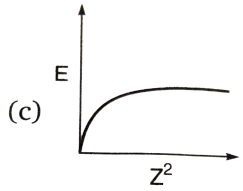
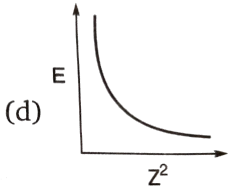


D.



Answer:

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36. If ε_0 be the permittivity of vacuum and r be the radius of orbit of H-atom in which electron is revolving, then velocity of electron is given by :

A. $v = \dfrac{e}{\sqrt{4\pi\varepsilon_0 rm}}$

B. $v = e \times \sqrt{4\pi\varepsilon_0 rm}$

C. $v = \frac{4\pi\varepsilon_0 rm}{e}$

D. $v = \frac{4\pi\varepsilon_0 rm}{e^2}$

Answer:

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37. Which of the following statement(s) is/are consistent with the Bohr theory of the atom (and no other)?

(1) An electron can remain in a particular orbit as long as it continuously absorbs radioation of a definite frequency.

(2) The lowest energy orbits are those closest to the nucleus.

(3) All electrons can jump from the K shell to the M shell by emitting radiation of a definite frequency.

A. 1,2,3,

B. 2 only

C. 3 only

D. 1,2

Answer:

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38. The ionization potential for the electron in the ground state of the hydrogen atom is 13.6 eV atom^{-1}. What would be the inization potential for the electron in the first excited state of Li^{+} ?

A. 3.4 eV

B. 10.2 eV

C. 30.6 eV

D. 6.8 eV

Answer:

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39. What is the energy content per photon (J) for light of frequency 4.2×10^{14} Hz?

A. 2.8×10^{-21}

B. 2.5×10^{-19}

C. 2.8×10^{-19}

D. 2.5×10^{-18}

Answer:

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40. Wavelength for high energy EMR transition in H-atom is 91 nm. What energy is needed for this transition?

A. 1.36 eV

B. 1240 eV

C. 13 eV

D. 13.6 eV

Answer:

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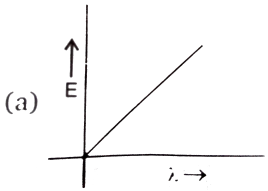
41. Which graph shows how the energy E of a photon of light is related to its wavelengths (λ)?

A.



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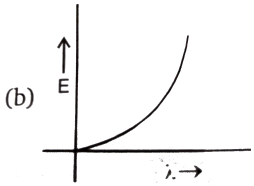

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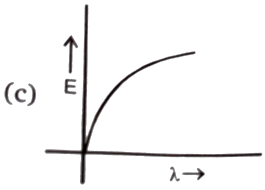
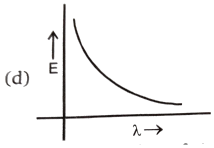


D. 

Answer:

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42. Assume that 10^{-17}J of light energy is needed by the interior of the human eye to see an object . How many photons of green light $(\lambda = 495nm)$ are needed to generate this minimum energy .

$[h = 6.6 \times 10^{-34} Js]$

A. 25

B. 30

C. 45

D. 60

Answer:

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43. Line spectra is characteristic of :

A. molecules

B. atoms

C. radicals

D. none of these

Answer:

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44. The spectrum produced from an element is :

A. atomic spectrum

B. line spectrum

C. absorption spectrum

D. any one of the above

Answer:

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45. Electronic transition in He^+ ion takes from n_2 to n_1 shell such that :

$2n_2 + 3n_1 = 18$

$2n_2 + 3n_1 = 6$

What will be the total number of photons emitted when electrons transit to n_1 shell?

A. 21

B. 15

C. 20

D. 10

Answer:

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46. Which of the following expressions represents the spectrum of Balmer series (If n is the principal quantum number of higher energy level) in Hydrogen atom ?

A. $\bar{v} = \frac{R(n-1)(n+1)}{n^2}$

B. $\bar{v} = \frac{R(n-2)(n+2)}{4n^2}$

C. $\bar{v} = \frac{R(n-2)(n+2)}{n^2}$

D. $\bar{v} = \frac{R(n-1)(n+1)}{4n^2}$

Answer:

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47. Multiple or fine structure of spectral lines is due to :

A. presence of main energy levels

B. presence of sub-levels

C. presence of electronic configuration

D. is not a characteristics of the atom

Answer:

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48. With increasing principal quantum number, the energy difference between adjacent energy levels in H-atom:

A. decreases

B. increases

C. remains constant

D. decreases for low value of Z and increases for higher value of Z.

Answer:

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49. Find the value of wave number $\left(\bar{v}\right)$ in terms of Rydberg's constant, when transition of electron takes place between two lvels of He^{+} ion whose sum is 4 and difference is 2.

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

B. $\frac{32R}{9}$

C. $\frac{3R}{4}$

D. none of these

Answer:

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50. What is the wavelength in nm of the spectral line associated with a transition from n=3 to n= 2 for the Li^{2+} ion?

A. 219

B. 656

C. 73.0

D. 486

Answer:

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51. What is the energy (kJ/mol) associated with the de-excitation of an electron from $n = 6$ to $n = 2$ in He^+ ion?

A. 1.36×10^6

B. 1.36×10^3

C. 1.16×10^3

D. 1.78×10^3

Answer:

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52. What is the shortest wavelength line in the Paschen series of Li^{2+} ion?

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

B. $\frac{9}{R}$

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

D. $\frac{9R}{4}$

Answer:

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53. What is the maximum wavelength line in the Lyman series of He^{+} ion?

A. 3R

B. $\frac{1}{3R}$

C. $\frac{4}{4R}$

D. None of these

Answer:

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54. Which of the following electron transitions in a hydrogen atom will require the largest amount of energy?

A. from $n = 1$ to $n = 2$

B. from $n = 2$ to $n = 4$

C. from $n = 5$ to $n = 1$

D. from $n = 3$ to $n = 5$

Answer:

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55. Which electronic transition in a hydrogen atom, starting from the orbit n=7, will produce infrared light of wavelength 2170 nm?

$\left(Given: R_H = 1.09677 \times 10^7 M^{-1}\right)$

A. $n = 7 \text{ to } n = 6$

B. from $n = 2$ to $n = 4$

C. from $n = 5$ to $n = 1$

D. from $n = 3$ to $n = 5$

Answer:

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56. The hydrogen atom in the ground state is excited by mass of monochromatic radiations of wavelength

$\lambda Å$. The resulting spectrum consists of maximum 15 different lines . What is the value of λ ? $\left(R_H = 109737 cm^{-1}\right)$.

A. $937.3Å$

B. 1025Å

C. 1236Å

D. None of these

Answer:

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57. Electromagnetic radiation (photon) with highest wavelength result when an electron in the hydrogen atom falls from $n = 6$ to :

A. $n = 1$

B. $n = 2$

C. $n = 3$

D. $n = 5$

Answer:

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58. When an electron jumps from L to K shell -

A. energy is absorbed

B. energy is released

C. energy is neither absorbed nor released

D. energy is sometimes absorbed and some times released

Answer:

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59. How do the energy gaps between successive electron energy levels in an atom very from low to high n values ?

A. All energy gaps are the same

B. The energy gap decreases as n increases

C. The energy gap increases as n increases

D. the energy gap changes unpredictably as n increases

Answer:

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60. The H-spectrum confirms

A. Heisenberg's uncertainty principle

B. diffraction

C. polarization

D. presence of quantized energy level

Answer:

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61. The splitting of spectral lines in an external magnetic field is known as the

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62. bule coloure of the sky is due to :

A. absorption of light by atmospheric gases

B. transmission of light

C. wavelength of scattered light

D. all of the above

Answer:

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63. Describe the orbital with quantum number n=5 and l=3

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64. Slope of V_0 vs v curve is (where V_0= Stopping potential, v=subjected freqency)

A. e

B. $\frac{h}{e}$

C. ϕ

D. h

Answer:

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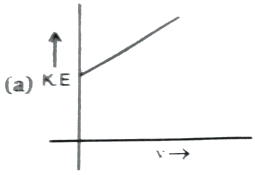
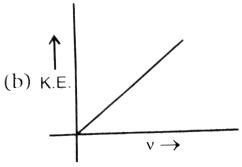
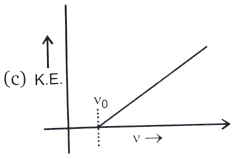
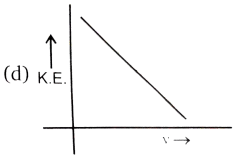
65. According to Einstein's photoelectric equation, the graph between kinetic energy of photoelectrons ejected and the frequency of the incident radiation is :

A. 

B. 

C. 

D. 

Answer:

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66. The photoelectric emission from a surface starts only when the light incident upon the surface has certain minimum:

A. intensity

B. wavelength

C. Frequency

D. velocity

Answer:

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67. If λ_o and λ be the threshold wavelength and wavelength of incident light , the velocity of photoelectron ejected from the metal surface is :

A. $\sqrt{\frac{2h}{m}(\lambda_0 - \lambda)}$

B. $\sqrt{\frac{2hc}{m}(\lambda_0 - \lambda)}$

C. $\sqrt{\frac{2hc}{m}\left(\frac{\lambda_0 - \lambda}{\lambda\lambda_0}\right)}$

D. $\sqrt{\frac{2h}{m}\left(\frac{1}{\lambda_0} - \frac{1}{\lambda}\right)}$

Answer:

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68. A light source of wavelength λ illuminates a metal and ejects photoelectron with $(KE)^{\max} = 1eV$.

Another light source of wave length $\frac{\lambda}{3}$, ejects photoelectrons from same metal with $(KE)^{\max} = 5eV$.

Find the value of work function (eV) of metal.

A. 1 eV

B. 2 eV

C. 0.5 eV

D. None of these

Answer:

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69. Electronmagnetic radiations having $\lambda = 310\text{Å}$are subjected to a metal sheet having work function $= 12.8eV$. What will be the velocity of

photoelectrons with maximum Kinetic Energy....

A. 0, no emission will occur

B. 4.352×10^6 m/s

C. 3.09×10^6 m/s

D. 8.72×10^6 m/s

Answer:

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70. The ratio of slopes of $K_{\max}$ vs. V and V_0 vs. v curves in the photoelectric effect gives (v= freqency. $K_{\max}$ = maximum kinetic energy, V_0 =stopping potential) :

A. charge of electron

B. Planck's constant

C. work function

D. the ratio of Planck's constant and electronic charge

Answer:

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71. Radiation corresponding to the transition n=4 to n=2 in hydrogen atoms falls on a certain metal (work function=2.5 eV). The maximum kinetic energy of the photo-electrons will be:

A. 0.55 eV

B. 2.55 eV

C. 4.45 eV

D. None of these

Answer:

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72. Select the incorrect statement.

A. K.E. of photo-electron does not depend upon the wavelength of incident radiation

B. Photoelectric current depends on intensity of incident radiation and not on frequency

C. Stopping potentail depends on frequency of raditaion and not on intensity

D. None of these

Answer:

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73. Which is the de-Broglie equation?

A. $h = p\lambda$

B. $h = p\lambda^{-1}$

C. $h = \lambda p^{-1}$

D. $h = p + \lambda$

Answer:

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74. Which of the following has the largest de Broglie wavelength (all have eual velocity)?

A. CO_2 molecule

B. NH_3 molecule

C. Electron

D. Proton

Answer:

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75. The de-Broglie wavelength associated with a particle of mass $10^{-6}kg$ moving with a velocity of $10ms^{-1}$, is

A. 6.63×10^{-22}m

B. 6.63×10^{-29}m

C. 6.63×10^{-31}m

D. 6.63×10^{-34} m

Answer:

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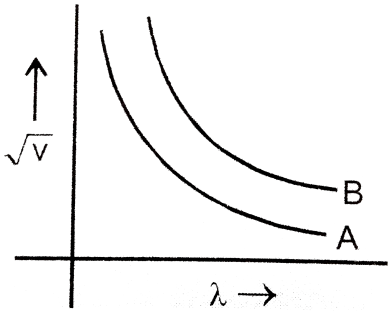
76. For two particles A and B, curves are plotted $\sqrt{V}$ against de-Broglie wavelengths, where V is the potential on the particles. Which of the

following relation is correct about the mass of particles?



A. $m_A = m_B$

B. $m_A > m_B$

C. $m_A < m_B$

D. $m_A$le m_(B)`

Answer:

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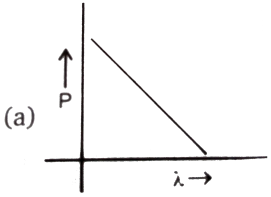
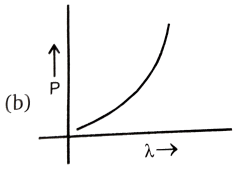
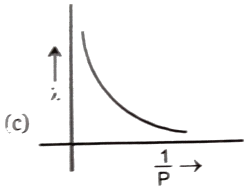
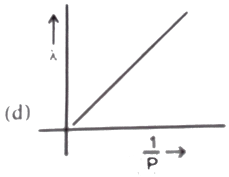
77. Which of following graphs correctly represents the variation of particle momentum with de-Broglie wavelength?

A. 

B. 

C. 

D. 

Answer:

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78. An excited state of H atom emits a photon of wavelength λ and returns in the ground state. The principal quantum number of excited

state is given by:

A. $\sqrt{\lambda R(\lambda R-1)}$

B. $\sqrt{\frac{\lambda R}{(\lambda R-1)}}$

C. $\sqrt{\lambda R(\lambda R-1)}$

D. $\sqrt{\frac{\lambda R-1}{(\lambda R)}}$

Answer:

Watch Video Solution

79. A dye absorbs a photon of wavelength λ and re $-$ emits the same energy into two phorons of wavelengths λ_1 and λ_2 respectively. The wavelength λ is related with λ_1 and λ_2 as :

A. $\lambda=\frac{\lambda_1+\lambda_2}{\lambda_1\lambda_2}$

B. $\lambda=\frac{\lambda_1\lambda_2}{\lambda_1+\lambda_2}$

C. $\lambda=\frac{\lambda_1^2\lambda_2^2}{\lambda_1+\lambda_2}$

D. $\lambda = \dfrac{\lambda_1 \lambda_2}{(\lambda_1 + \lambda_2)^2}$

Answer:

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80. Be^{3+} and a proton are accelerated by the same potential, their de $-$ Broglie wavelengths have the ratio (assume mass of proton $=$ mass of neutron) :

A. $1:2$

B. $1:4$

C. $1:1$

D. $1:3\sqrt{3}$

Answer:

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81. de Broglie wavelength of an electron after being accelerated by a potential difference of V volt from rest is :

A. $\lambda = \frac{1.23}{\sqrt{m}}$

B. $\lambda = \frac{1.23}{\sqrt{h}}m$

C. $\lambda = \frac{1.23}{\sqrt{V}}nm$

D. $\lambda = \frac{1.23}{V}$

Answer:

Watch Video Solution

82. An electron travels with a velocity of x ms^{-1}. For a proton to have the same de-Broglie wavelength, the velocity will be approximately:

A. $\frac{1840}{x}$

B. $\frac{x}{1840}$

C. 1840 x

D. x

Answer:

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83. The momentum $(\text{in} kg - m / s)$ of photon having 6 MeV energy is :

A. 3.2×10^{-21}

B. 2.0

C. 1.6×10^{-21}

D. none of these

Answer:

Watch Video Solution

84. The number of photons of light having wave number 'x' in 10 J of energy source is :

A. $10hcx$

B. $\frac{hc}{10x}$

C. $\frac{10}{hcx}$

D. none of these

Answer:

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85. What is the total number of sigma & pi bond in the following molecules : 1. CH2Cl2

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86. If a_0 be the radius of first Bohr's orbit of H-atom, the de-Broglie's wavelength of an electron revolving in the second Bohr's orbit will be:

A. $6\pi a_0$

B. $4\pi a_0$

C. $2\pi a_0$

D. None of these

Answer:

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87. Energy required to ionise 2 mole of gaseous He^+ ion present in its ground state is :

A. 54.4 eV

B. $108.8N_A$ eV

C. $54.4N_A$ eV

D. $108.8eV$

Answer:

Watch Video Solution

88. Which of the following is the most correct expression for Heisenberg's uncertainity principle?

A. $\triangle x.\ \triangle p = \frac{h}{4\pi}$

B. $\triangle x.\ \triangle p \geq \frac{h}{4\pi}$

C. $\triangle x.\ \triangle p \leq \frac{h}{4\pi}$

D. $\triangle x.\ \triangle v = \frac{h}{4\pi}$

Answer:

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89. The Heisenberg uncertainty principle can be applied to:

A. a cricket ball

B. a football

C. a jet aeroplane

D. an electron

Answer:

Watch Video Solution

90. What is the total number of sigma & pi bond in the following molecule : CH3- CH3

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91. If an electron is travelling at 200 m/s within 1 m/s uncertainty, whtat is the theoretical uncertainty in its position in mum (micrometer)?

A. 14.5

B. 29

C. 58

D. 114

Answer:

Watch Video Solution

92. What is the total number of sigma & pi bond in the following molecule C2H2

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93. "The exact path of electron in 2p-orbital cannot be determined." The above statement is based upon:

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94. An orbital is occupied by an electrons with the quantum numbers n = 4, l = 1. How many orbitals of this type are found in a multi- electron atom ?

A. 6s,4f,5d,6p

B. 4f,6s,5d,6p

C. 5d,4f,6s,6p

D. 4f,5d,6s,6p

Answer:

Watch Video Solution

95. The correct Schrodinger's wave equation for a electron with total energy E and potential energy V is given by:

A. $\frac{\partial^2 \Psi}{\partial x^2} + \frac{\partial^2 \Psi}{\partial y^2} + \frac{\partial^2 \Psi}{\partial z^2} + \frac{8\pi^2}{mh^2}(E - V)\Psi = 0$

B. $\frac{\partial^2 \Psi}{\partial x^2} + \frac{\partial^2 \Psi}{\partial y^2} + \frac{\partial^2 \Psi}{\partial z^2} + \frac{8\pi m}{h^2}(E - V)\Psi = 0$

C. $\frac{\partial^2 \Psi}{\partial x^2} + \frac{\partial^2 \Psi}{\partial y^2} + \frac{\partial^2 \Psi}{\partial z^2} + \frac{8\pi^2 m}{h^2}(E - V)\Psi = 0$

D. None of these

Answer:

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96. Find the energy of each of the photon which have wavelength of 0.50 A*

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97. In Schrodinger wave mechanical model $\Psi^2(r, \theta, \phi)$ represents :

A. amplitude of electron wave

B. probability density of electron

C. total probability of finding electron around the nucleus

D. orbit

Answer:

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98. Radial amplitude of electron wave can be represented by:

A. $R(r)$

B. $R^2(r)$

C. $4\pi r^2$

D. $4\pi r^2 R^2(r)$

Answer:

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99. Arrange the following orbitals of H-atom in the increasing order of their energy.

$3p_x$, $2s$, $4d_{xy}$, $3s$, $4p_z$, $3p_y$, $4s$

A. $2s < 3s = 3p_x = 3p_y < 4s = 4p_z = 4d_{xy}$

B. $2s < 3s < 3p_x = 3p_y < 4s = 4p_z = 4d_{xy}$

C. $2s < 3s < 3p_x = 3p_y < 4s = 4p_z = 4d_{xy}$

D. $2s < 3s < 3p_x = 3p_y < 4s < 4p_z < 4d_{xy}$

Answer:

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100. In a hydrogen atom, which orbital is higher in energy than a 3s-orbital?

A. 2s

B. 3p

C. 3d

D. 4s

Answer:

Watch Video Solution

101. The radii of maximum probability for 3s,3p, and 3d electrons are in the order :

A. $(r_{\max})3d > (r_{\max})3p > (r_{\max})3s$

B. $(r_{\max})3d > (r_{\max})3s > (r_{\max})3p$

C. $(r_{\max})3s > (r_{\max})3p > (r_{\max})3d$

D. None of these

Answer:

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102. The correct order of closeness of 3s,3p,3d orbitals of nucleus is :

A. $3d > 3p > 3s$

B. $3s > 3p > 3d$

C. $3s > 3d > 3p$

D. $3d > 3s > 3p$

Answer:

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103. The correct order of total number of node of atomic orbitals is :

A. $4f > 6s > 5d$

B. $6s > 5d > 4f$

C. $4f > 5d > 6s$

D. $5d > 4f > 6s$

Answer:

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104. If the susbsidiary quantum number of a subenergy level is 4, then no. of degenerate orbitals are

A. 7

B. 5

C. 9

D. 11

Answer:

Watch Video Solution

105. Which two orbitals are located along the axis, and not between the axis?

A. d_{xy}, d_{z^2}

B. d_{xy}, p_z

C. d_{yz}, p_x

D. $p_z, d_{x^2-y^2}$

Answer:

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106. In a set of degenerate orbitals, the electrons distribute themselves to retain similar spins as far as possible. This statement is attributed to :

Watch Video Solution

107. Which of the following rules could explain the presence of three unpaired electrons in N-atom?

A. Hund's rule

B. aufbau's principles

C. Heisenberg's uncertainty principle

D. Pauli's exculsion principle

Answer:

Watch Video Solution

108. Explain Pauli's exclusion principle.

A. nuclues of an atom contains no negative charge

B. electrons move in circular orbits around the nucleus

C. electrons occupy orbitals of lowest energy

D. All the four quantum number of two electrons in an atom cannot be equal.

Answer:

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109. For which of the following sets of quantum numbers, an electrons will have the highest energy ?

A.
n	l	m	s
3	2	1	$-1/2$

B.
n	l	m	s
4	3	-1	$+1/2$

C.
n	l	m	s
4	1	-1	$+1/2$

D.
n	l	m	s
5	0	0	$-1/2$

Answer:

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110. Which of the following statements cocerning the four quantum numbers is false?

A. n gives idea of the size of an orbital

B. l gives the shapt of an orbital

C. m gives the energy of the electron in the orbital

D. s gives the direction of spin of the electron in an orbital

Answer:

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111. Maximum numbe of electron in a subshell is given by

A. $(2l + l)$

B. $2(2l + 1)$

C. $(2l + 1)^2$

D. $2(2l + 1)^2$

Answer:

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112. In any subshell, the maimum number of electrons having same value of spin quantum number is :

A. $\sqrt{l(l + 1)}$

B. $l + 2$

C. $2l + 1$

D. $4l + 2$

Answer:

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113. The orbital angular momentum of $3p$ electron is :

A. $\sqrt{3}h$

B. $\sqrt{6}h$

C. zero

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

Answer:

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114. The atomic orbitals are progerssively filled in order of increasing energy. The principle is called as :

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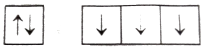
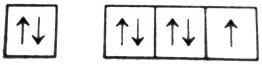
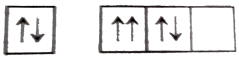
115. The orbital diagram in which both Pauli's exclusion principle and Hund's rule are violated , is :

A. (a) 

B. (b) 

C. (c) 

D. (d) 

Answer:

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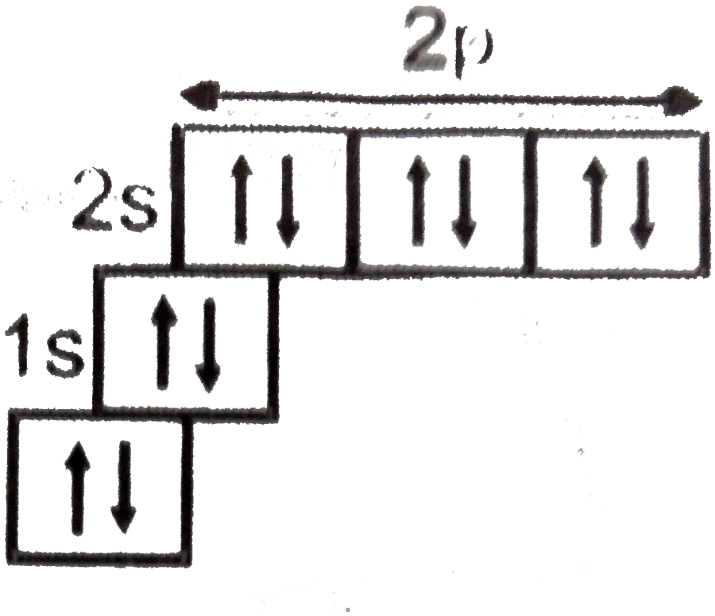
116. Which of the following elements is represents by the electronic configration ?



A. Nitorgen

B. Flourine

C. Oxygen

D. Neon

Answer:

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117. The ratio of magnetic of Fe (III) and Co (II) is :

A. $\sqrt{5}:\sqrt{7}$

B. $\sqrt{35}:\sqrt{15}$

C. $7:3$

D. $\sqrt{24}:\sqrt{15}$

Answer:

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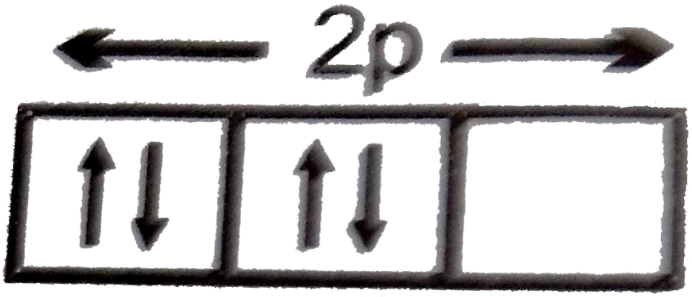
118. If the electronic structure of oxygen atom is written as `1s^(2) , 2s^(2)



it would

violate

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119. A compound of vanadium has a magneitc moment (μ) of $1.73BM$. If the vanadium ion in the compound is present as V^{x+}, then, the value of x is ?

A. 1

B. 2

C. 3

D. 4

Answer:

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120. d^6 configuration will result in total spin of :

A. $\frac{3}{2}$

B. $\frac{1}{2}$

C. 2

D. 1

Answer:

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121. The probability of finding electron in d_{xy} orbital is :

A. along $X-$ and $Y-$ axis

B. along $X-$ and $Z-$ axis

C. along $Y-$ and $Z-$ axis

D. at an angle of 45° with X-axis

Answer:

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122. Select correct statement :

A. The lower the value of $(n + l)$ for an orbital, the higher is its energy.

B. If two orbitals have the same value of $(n + l)$ the orbital with higher value of n will have lower energy.

C. The energy of an electron in a multi-electron atom depends on quantum number n only

D. The energy of an electron in hudrogen atom depends on quantum number n only

Answer:

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123. Read the following statements and choose the correct option. (I) If the radius of the first Bohr orbit of hydrogen atom us redis of 2^{nd} orbit of Li^{2+} would be 4r (II) For s-orbital electron , the orbital angular momentum is zero

A. only I is correct

B. only II is correct

C. bothare correct

D. both are incorrect

Answer:

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124. The quantum number of four electrons (el to e4) are given below :-

	n	l	m	s
$e1$	3	0	0	$+1/2$
$e2$	4	0	0	$1/2$
$e3$	3	2	2	$-1/2$
$e4$	3	1	-1	$1/2$

The correct order of decreasing energy of these electrons is :

A. e4 gt e3 gt e2 gt e1

B. e2 gt e3 gt e4 gt e1

C. e3 gt e2 gt e4 gt e1

D. e1 gt e4 gt e2 gt e3

Answer:

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125. The energy of an electron of $2p_x$ orbital is :

A. greatern than $2p_y$orbital

B. less than $2p_z$ orbital

C. equal to 2s orbital

D. same as that of $2p_x \text{and} 2p_z$ orbital

Answer:

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126. In group 15 elements, the number of unpaired electrons in valence shell is___.

A. 0

B. 2

C. 3

D. 4

Answer:

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127. The orientation of an orbital is governed by the quantum number known as ..... and is represented by the symbol .....

A. principal quantum number (n)

B. angular momentum quantum number

C. magenetic quantum number (m_l)

D. spin quantum number (m_s)

Answer:

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128. What is the maximum number of electrons in a subshell that can have the quantum numbers n = 3 and l = 2 ?

A. 2

B. 5

C. 6

D. 10

Answer:

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129. which of the following statements about an electron with $m_1 = +2$ is incorrect?

A. The electron could be in the third shell

B. The electron is in a non-spherical orbital

C. The electron may have $m_s = \frac{1}{2}$

D. The electron is not in a d-orbital

Answer:

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130. which of the following set of quantum numbers is impossible for an electron?

A. $n = 1, l = 0, m_l = 0, ms = +\frac{1}{2}$

B. $n = 9, l = 7, m_l = -6, m_s = -\frac{1}{2}$

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

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

Answer:

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131. In a 3d subshell, all the five oprbitals are degenerate. What does it mean?

A. All the orbitals have the same3 orientation.

B. All the orbitals have the same shape.

C. All the orbitals have the same energy.

D. All the orbitals are unoccupied.

Answer:

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132. which of the following subshell can accommodate as many as 10 electrons?

A. 2d

B. 3d

C. $3d_{xy}$

D. $3d_z2$

Answer:

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133. which of the following statements is correct for an electron having azimuthal quantum number l=2?

A. The electron may be in the lowest energy shell.

B. The electron is in a spherical orbital.

C. The electron must have spin $m_s = +\frac{1}{2}$

D. The electron may have a magnetic quantum number=-1

Answer:

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134. Which of the following statement is incorrect?

A. The concepts of "penetration" and "shielding" are important in deciding the energetic ordering of orbitals in multi-electon atoms

B. A wave-funtion can have positive and negative values

C. "Radial nodes" can appear in radial probability distribution function.

D. The shape of an orbital is given by the principal quantum number.

Answer:

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135. For an $4p_y$ orbital, there are nodal plane..... and azimuthal quantum number l.....

A. 1,0

B. 0,1

C. 1,1

D. 2,1

Answer:

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136. which of the folowing statement is correct?

A. Number of angular nodes =n-l-1

B. Number of radial nodes=l

C. Total number of nodes=n-1

D. All of these

Answer:

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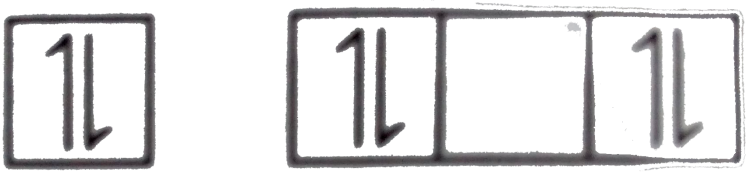
137. Give the correct order of initials T(true)F(false) for following satements. (I) If electron has zero quantum magnetic numbers, then it must be present in s-orbital

(II) In  orbital diagram, Pauli's exclusion principal is violated

(III) Bohr's model can explain spectrum of the hydrogen atom.

(IV) A d-orbital can accommodate maximum 10 electrons only.

A. (a) TTFF

B. (B) FFTF

C. (C)TFTT

D. (D) FFTT

Answer:

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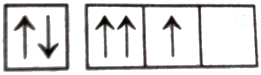
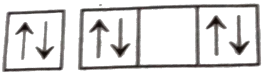
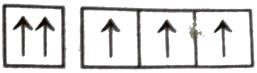
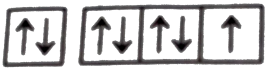
138. The orbital diagram in which both Pauli's exclusion principle and Hund's rule are violated , is :

A. 

B. 

C. 

D. 

Answer:

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139. It is not possible to explain the Pauli's exclusion principal with the help of this atom.

A. B

B. Be

C. C

D. H

Answer:

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140. The subshell that rises after f subshell is called g subshell

What is the total number of orbitals in the shell in which the g subshell first occur?

A. 9

B. 16

C. 25

D. 36

Answer:

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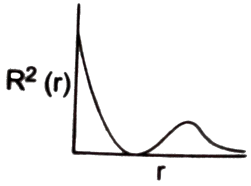
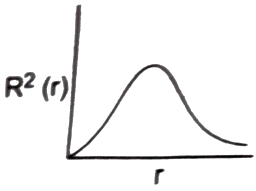
141. The variation of radial probability density R^2 (r) as a function of distance r of the electron from the nucleus for 3p orbital:

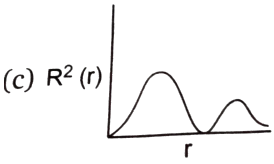
A.

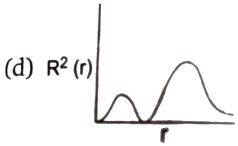


B.



C.



D. 

Answer:

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142. How many electron(S) in an atom can have n =3, l = 2?

A. 2

B. 4

C. 6

D. 8

Answer:

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143. If n and l are respectively the principal and azimuthal quantum numbers , then the expression for calculating the total number of electrons in any energy level is :

A. $\sum_{l=0}^{l=n} 2(2l+1)$

B. $\sum_{l=1}^{l=n} 2(2l+1)$

C. $\sum_{l=0}^{l=n} 2(2l+1)$

D. $\sum_{l=0}^{l=n-1} 2(2l+1)$

Answer:

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144. Maximum number of nodes are present in :

A. 5s

B. 5p

C. 5d

D. All have same number of nodes

Answer:

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145. The possible correct set of quantum numbers for the unpaired electron of Cl atom is:

A. $2, 0, 0, +\frac{1}{2}$

B. $2, 1, -1, +\frac{1}{2}$

C. $3, 1, 1, +\frac{1}{2}$

D. $3, 0, \pm\frac{1}{2}$

Answer:

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146. The aufbau principle implies that a new electron will enter an orbital for which:

A. n has a lower value

B. l has a lower value

C. (n+l) value is maximum

D. (n+l) value is minimum

Answer:

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147. What is double covalent bond?

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148. Calculate number of valance electrons in Mn^{2+}

Watch Video Solution

149. Which of the following set of quantum numbers shows orbital of highest energy ?

A. n = 4, l = 0, m = 0, $s = +\frac{1}{2}$

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

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

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

Answer:

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150. A subshell n = 5, l = 3 can accommodate :

A. 10electrons

B. 14 electrons

C. 18 electrons

D. None of these

Answer:

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151. In H-atom energy of electron is determined by :

A. only n

B. n, l

C. n, l, m

D. all the four quantum numbers.

Answer:

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152. In iron atom, how many electrons have n=3 and l=2?

A. 1

B. 2

C. 6

D. 10

Answer:

Watch Video Solution

153. How many electrons in an atom can have n = 4, l =2 ,m= -2 and $s = +\frac{1}{2}$?

A. 1

B. 2

C. 5

D. 10

Answer:

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154. The degencracy of 1st excited state of H atom is _____ (Ignore efffect of spin)

A. 2

B. 3

C. 4

D. 8

Answer:

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155. A gas occupies 200mL at a pressure of 0.820 bar at 20 o C. How much volume will it occupy when it is subjected to external pressure of 1.025

bar at the same temperature?

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156. The electronic configuration of K+ is:

A. {Ar} 3d1

B. {Ne] 3s2 3p6

C. {Ne} 3s2

D. {Ar}4s2

Answer:

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157. For which of the following sets of quantum numbers, an electrons will have the highest energy ?

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

B. n = 3, l = 0, $m_l = 0, m_s = -\frac{1}{2}$

C. n = 3, l = 2, $m_l = 0, m_s = +\frac{1}{2}$

D. n =4, l = 1, $m_l = -1, m_s = -\frac{1}{2}$

Answer:

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158. The set of quantum numbers, n = 3, l = 2, $m_l = 0$

A. describes an electron in a 2s orbital

B. is not allowed

C. describes an electron in a 3p orbital

D. describes one of the five orbitals same energy

Answer:

Watch Video Solution

159. The set of quantum numbers, n = 3, l = 2, $m_l = 0$

A. describes an electron in a 2s orbital

B. describes one of the five orbital of a similar type

C. describes an electron in a 2p orbitals

D. is not allowed

Answer:

Watch Video Solution

160. Consider the argon atom. For how many electrons does this atom have $m_l = 1$?

A. 1

B. 6

C. 4

D. 2

Answer: C

Watch Video Solution

161. An orbital is occupied by an electrons with the quantum numbers n = 4, l = 1. How many orbitals of this type are found in a multi- electron atom ?

A. 4p, 3

B. 4s, 1

C. 4d, 5

D. 4p, 6

Answer:

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162. Which of the following sets of quantum numberrs discribes the elecron which is removed most easily from a potassium atom in its ground state ?

A. n = 3, l = 1, $m_l = 1, m_s = -\frac{1}{2}$

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

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

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

Answer:

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163. The subshell that arises after f is called the g subshell.How many electrons may occupy the g subshell?

A. 9

B. 7

C. 5

D. 18

Answer:

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164. Which of the following electron configurations is correct for iron, (atomic number26)?

A. [kr]$4s^1 3d^6$

B. [kr]$4s^1 3d^7$

C. [Ar]$4s^2 3d^6$

D. [kr]$4s^2 3d^6$

Answer:

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165. which of the following electron configurations is correct for copper, (atomic number29)

A. [Ar]$3d^{10}4s^1$

B. [Kr]$3d^9 4s^1$

C. [Ar]$3d^9 4s^2$

D. [Kr]$3d^{10}4s^1$

Answer:

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166. Give the electronic configurations of copper and chromium.

A. due to extra stability of exacly half filled and exactly fully filled sub shells

B. bacause they belong to d-block

C. both the above

D. None of the above

Answer:

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167. Draw lewis structure of flourine.

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168. A gas occupies a volume of 250 ml at 745 mm Hg and 25 ∘ C. What additional pressure is required to reduce the gas volume to 200 ml at the same temperature?

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169. Among the following series of transition metal ions the one where all metal ions have $3d^2$ electronic configuration is

A. $Ti^{2+}, V^{3+}, Cr^{4+}, Mn^{5+}$

B. $Ti^{3+}, V^{2+}, Cr^{3+}, Mn^{4+}$

C. $Ti^{+}, V^{4+}, Cr^{6+}, Mn^{7+}$

D. $Ti^{4+}, V^{3+}, Cr^{2+}, Mn^{3+}$

Answer:

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

A. Mn

B. Ti

C. V

D. Al

Answer:

Watch Video Solution

171. Which of the following orbitals has two spherical nodes?

A. 2s

B. 4s

C. 3d

D. 6f

Answer:

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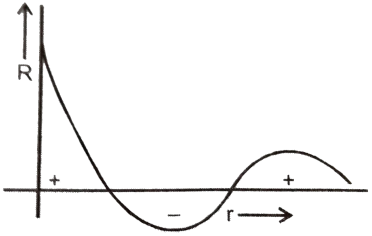
172. Wave function of an orbital is plotted against the distance from nucleus. The graphical representation is of :



A. 1s

B. 2s

C. 3s

D. 2p

Answer:

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173. The Schrodinger wave equation for hydrogen atom is $\Psi_{2s} = \frac{1}{4\sqrt{2\pi}}\left(\frac{1}{a_0}\right)^{3/2}\left(2 - \frac{r}{a_0}\right)e^{-r/a_0}$, where a_0 is Bohr's radius . If the radial node in 2s be at r_0 , then r_0 would be equal to :

A. $\frac{a_0}{2}$

B. $2a_0$

C. $\sqrt{2}a_0$

D. $\frac{a_0}{\sqrt{2}}$

Answer:

Watch Video Solution

174. The Schrodinger wave equation for hydrogen atom is

$$\Psi(\text{radial}) = \frac{1}{16\sqrt{4}}\left(\frac{Z}{a_0}\right)^{3/2}\left[(\sigma-1)\left(\sigma^2-8\sigma+12\right)\right]e^{-\sigma/2}$$

where a_0 and Z are the constant in which anwer can be expressed and $\sigma = \frac{2Zr}{a_0}$

minimum and maximum position of radial nodes from nucleus are .... respectively.

A. $\frac{a_0}{Z}, \frac{3a_0}{Z}$

B. $\frac{a_0}{2Z}, \frac{a_0}{Z}$

C. $\frac{a_0}{2Z}, \frac{3a_0}{Z}$

D. $\frac{a_0}{2Z}, \frac{4a_0}{Z}$

Answer:

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175. Potential energy of electrom present in He^+ is :

A. $\frac{e^2}{2\pi\varepsilon_0 r}$

B. $\frac{3e^2}{4\pi\varepsilon_0 r}$

C. $\frac{-2e^2}{4\pi\varepsilon_0 r}$

D. $\frac{-e^2}{4\pi\varepsilon_0 r^2}$

Answer:

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176. A single electron in an ion has ionization energy equal to $217.6eV$. What is the total number of neutrons present in one ion of it?

A. 2

B. 4

C. 5

D. 9

Answer:

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177. For a hypothetical hydrogen like atom, the potential energy of the system is given by $U(r) = \frac{-Ke^2}{r^3}$, where r is the distance between the two particles. If Bohr's model of quantization of angular momentum is applicable then velocity of particle is given by:

A. $v = \frac{n^2h^3}{Ke^2 8\pi^3 m^2}$

B. $v = \frac{n^3h^3}{8Ke^2\pi^3m^2}$

C. $v = \frac{n^3h^3}{24Ke^2\pi^3m^2}$

D. $v = \frac{n^2h^3}{24Ke^2\pi^3m^2}$

Answer:

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178. A beam of specific kind of particles of velocity $2.1 \times 10^7 m/s$ is scattered by a gold $(Z = 79)$ nuclei. Find out specific charge (charge/mass) of this particle if the distance of closest approach is $2.5 \times 10^{-14} m$.

A. 4.84×10^7 C/g

B. 4.84×10^{-7} C/kg

C. 2.42×10^7 C/kg

D. 3×10^{-12} C/kg

Answer:

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179. What is the angular velocity (ω) of an electron occupying second orbit of Li^{2+} ion?

A. $\frac{8\pi^3 me^4}{h^3}K^2$

B. $\frac{8\pi^3 me^4}{9h^3}K^2$

C. $\frac{64}{9} \times \frac{\pi^3 me^4}{h^3}K^2$

D. $\frac{9\pi^3 me^4}{h^3}K^2$

Answer:

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180. The ratio of the radius difference between 4^{th} and 3^{rd} orbit of H-atom and that of Li^{2+} ion is :

A. $1:1$

B. $3:1$

C. $3:4$

D. $9:1$

Answer:

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181. The velocity of an e in excited state of H-atom is $1.093 \times 10^6 m/s$, what is the circumference of this orbit?

A. 3.32×10^{-10} m

B. 6.64×10^{-10} m

C. 13.30×10^{-10} m

D. 13.28×10^{-8} m

Answer:

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182. The angular momentum of an electron in a Bohr's orbit of He^+ is 3.1652×10^{-34} kg-m^2/sec. What is the wave number in terms of Rydberg constant (R) of the sepectral line emitted when an electron falls from this level to the first excited state.l [Use h $= 6.626 \times 10^9 - 34)$ Js]

A. 3R

B. $\frac{5R}{9}$

C. $\frac{3R}{4}$

D. $\frac{8R}{9}$

Answer:

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183. If radiation corresponding to second line of "Balmer series" of Li^{+2} ion, knocked out electron from first excited state of H-atom, then kinetic

energy of ejected electron would be:

A. $2.55eV$

B. $4.25eV$

C. $11.25eV$

D. $19.55eV$

Answer:

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184. When an electron makes a transition from $(n+1)$ state of nth state, the frequency of emitted radistions is related to n according to $(n>>1)$:

A. $v=\frac{2cRZ^2}{n^3}$

B. $v=\frac{cRZ^2}{n^4}$

C. $v=\frac{cRZ^2}{n^2}$

D. $v = \frac{2cRZ^2}{n^2}$

Answer:

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185. In a collection of H-atoms, all the electrons jump from n=5 to ground level finally (directly of indirectly) ,without emitting any line in Blamer series. The number of possible different radiations is :

A. 10

B. 8

C. 7

D. 6

Answer:

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186. An electron is allowed to move freely in a closed cubic box of length of side 10 cm. The uncertainty in its velocity will be :

A. $3.35 \times 10^{-4}\ \text{m sec}^{-1}$

B. $5.8 \times 10^{-4}\ \text{m sec}^{-1}$

C. $4 \times 10^{-5}\ \text{m sec}^{-1}$

D. $4 \times 10^{-6}\ \text{m sec}^{-1}$

Answer:

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187. Ground state energy of H-atom is (E_1),t he velocity of photoelectrons emitted when photon of energy E_2 strikes stationary Li^{2+} ion in ground state will be:

A. $v = \sqrt{\dfrac{2(E_2 - E1)}{m}}$

B. $v = \sqrt{\dfrac{2(E_2 + 9E1)}{m}}$

C. $v = \sqrt{\frac{2(E_2 - 9E1)}{m}}$

D. $v = \sqrt{\frac{2(E_2 - 3E1)}{m}}$

Answer:

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188. At which temperature will the translational kinetic energy of H-atom equal to that for H-atom of first line Lyman transition? (Given $N_A = 6 \times 10^{23}$)

A. 780K

B. 1.32×10^{95}K

C. 7.84×10^{4}K

D. $1000K$

Answer:

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189. For a 3s - orbital, value of Φ is given by following realation:

$$\Psi(3s) = \frac{1}{9\sqrt{3}}\left(\frac{1}{a_0}\right)^{3/2}(6 - 6\sigma + \sigma^2)e^{-\sigma/2}, \quad \text{where} \quad \sigma = \frac{2r.Z}{3a_0}$$

What is the maximum radial distance of node from nucleus?

A. $\frac{\left(3+\sqrt{3}\right)a_0}{Z}$

B. $\frac{a_0}{Z}$

C. $\frac{3}{2}\frac{\left(3+\sqrt{3}\right)a_0}{Z}$

D. $\frac{2a_0}{Z}$

Answer:

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190. Monochromatic radiation of specific wavelength is incident on H-atoms in ground state. H-atoms absorb energy and emit subsequently

radiations of six different wavelength. Find wavelength of incident radiations:

A. 9.75nm

B. 50nm

C. 85.8nm

D. 97.25nm

Answer:

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191. The energy of a I,II and III energy levels of a certain atom are E, $\frac{4E}{3}$ and 2E respectively. A photon of wavelength λ is emitted during a transition from III to I. what will be the wavelength of emission for II to I?

A. $\frac{\lambda}{2}$

B. λ

C. 2λ

D. 3λ

Answer:

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192. Calculate the minimum and maximum number of electrons which may have magnetic quantum number $m = +1$ and spin quantum number $s = -\frac{1}{2}$ in chromium (Cr)

A. 0,1

B. 1,2

C. 4,6

D. 2,3

Answer:

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193. An electron in a hydrogen atom in its ground state absorbs 1.5 times as much energy as the minimum required for it to escape from the atom. What is the velocity of the emitted electron?

A. 1.54×10^6 m/s

B. 1.54×10^8 m/s

C. 1.54×10^3 m/s

D. 1.54×10^4 m/s

Answer:

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194. In a measurement of quantum efficiency of photosynthesis in green plants, it was found that 10 quanta of red light of wavelength 6850 Å were needed to release one molecule of O_2. The average energy storage in this process for 1 mol O_2 evolved is 112 Kcal.

What is the energy conversion efficieny in this experiment?

Given: 1 cal =4.18 J, $N_A = 6 \times 10^{23}$, $h = 6.63 \times 10^{-34}$ J.s

A. 23.5

B. 26.9

C. 66.34

D. 73.1

Answer:

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195. A hydrogen like species (atomic number Z) is present in a higher excited state of quantum number n. This excited atom can make a transitionn to the first excited state by successive emission of two photons of energies 10.20 eV and 17.0 eV respectively. Altetnatively, the atom from the same excited state can make a transition to the second excited state by successive of two photons of energy 4.25 eV and 5.95 eVv respectively. Determine the value of Z.

A. 1

B. 2

C. 3

D. 4

Answer:

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196. H-atom is exposed to electromagnetic radiation of $\lambda = 1025.6$ Å and excited atom gives out induced radiation. What is the minimum wavelength of the induced radiation?

A. $102.6nm$

B. 12.09 nm

C. 121.6 nm

D. 810.8 nm

Answer:

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197. If the lowest energy X-rays have $\lambda = 3.055 \times 10^{-8}$ m, estimate the minimum difference in energy between two Bohr's orbits such that an electronic transition would correspond to the emission of an X-ray. Assuming that the electrons in other shells exert no influence, at what Z (minimum) would a transition form the second level to the first result in the emission of an X-ray?

A. 1

B. 2

C. 3

D. 4

Answer:

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198. An α-particle having kinetic energy 5 MeV falls on a Cu-foil. The shortest distance from the nucleus of Cu to which α- particle reaches is (Atomic no. of Cu=29,$K = 9 \times 10^9 Nm^2 / C^2$)

A. 2.35×10^{-13} m

B. 1.67×10^{-14} m

C. 5.98×10^{-15} m

D. none of these

Answer:

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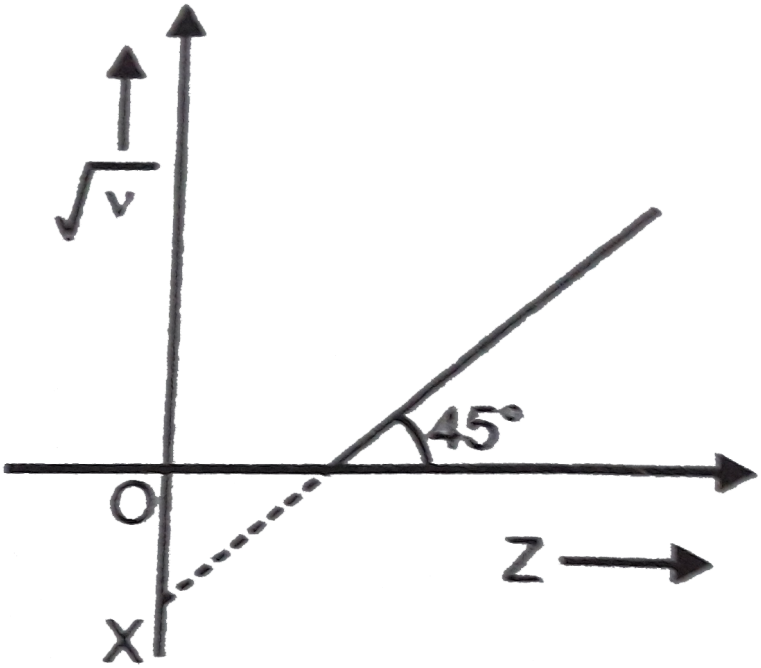
199. In the graph between $\sqrt{v}$ and Z for the Mosley's equation $\sqrt{v}$=a(Z-b), the intercept OX is -1 on $\sqrt{v}$ axis.



What is the frequency when atomic number (Z) is 51?

A. $50s^{-1}$

B. $100s^{-1}$

C. $2500s^{-1}$

D. None of these

Answer:

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200. Balmer gave an equation for wavelegth of visible region of H-spectrum as `lambda=(Kn^(2))/(n^(2)-4).

Where n= pricipal quantum number of energy level, K=constant in terms of R (Rydberg constant).

The value of K in term of R is :

A. R

B. $\frac{R}{2}$

C. $\frac{4}{R}$

D. $\frac{5}{R}$

Answer:

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201. The energy of seperation of an electron in a hydrogen like atom in excited state is 3.4eV. The de-Broglie wave length (in Å) associtated with the electron is :

A. 3.33

B. 6.66

C. 13.31

D. none of these

Answer:

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202. If I exciation energy for the H-like (hypothetical) sample is 24 eV, then binding energy in III excited state is :

A. 2 eV

B. 3 eV

C. 4 eV

D. 5 eV

Answer:

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203. Werner Heisenberg considered the limits of how precisely we can measure the properties of an electron or other microscopic particle. He determined that there is a fundamental limit to how closely we can measure both position and momentum. The more accurately we measure the momentum of a particle, the less accurately we can determine its position. The converse also true. This is summed up in what we now call the Heisenberg uncertainty principle.

The equation si $\delta x.\ \delta(mv) \geq \frac{h}{4\pi}$

The uncertainty in the position or in the momentum of a marcroscopic object like a baseball is too small to observe. However, the mass of microscopic object such as an electon is small enough for the uncertainty to be relatively large and significant.

If the uncertainties in position and momentum are equal, the uncertainty in the velocity is :

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

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

C. $\frac{1}{2m}\sqrt{\frac{h}{\pi}}$

D. none of these

Answer:

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microscopic object such as an electon is small enough for the uncertainty to be relatively large and significant.

If the uncertainty in velocity and position is same, then the uncertainty in momentum will be :

A. $\sqrt{\frac{hm}{4\pi}}$

B. $m\sqrt{\frac{h}{4\pi}}$

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

D. $\frac{1}{m}\sqrt{\frac{h}{4\pi}}$

Answer:

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The uncertainty in the position or in the momentum of a marcroscopic object like a baseball is too small to observe. However, the mass of microscopic object such as an electon is small enough for the uncertainty to be relatively large and significant.

What would be the minimum uncetaintty in de-Broglie wavelength of a moving electron accelerated by potential difference of 6 volt and whose uncetainty in position is $\frac{7}{22}$ nm?

A. 6.25Å

B. 6Å

C. 0.625Å

D. 0.3125Å

Answer:

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206. If the wavelength of series limit of Lyman series for He^+ ion is x Å, then what will be the wavelength of series limit of Balmer series for Li^{2+} ion?

A. $\frac{9x}{4}$ Å

B. $\frac{16x}{9}$ Å

C. $\frac{5x}{4}$ Å

D. $\frac{4x}{7}$ Å

Answer:

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207. The emission spectra is observed by the consequence of transition of electrons from higher energy state to ground state of He^+ ion. Six different photons are observed during the emission spectruring the transition, then what will be the minimum wavelength during this transition ?

A. $\frac{4}{27R_H}$

B. $\frac{4}{15R_H}$

C. $\lambda = \frac{15}{16R_H}$

D. $\frac{16}{15R_H}$

Answer:

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208. What transition in the hydrogen spectrum would have the same wavelength as Balmer transitio, $n = 4 \text{ to } n = 2$ in the He^+ spectrum?

A. n=3 to n=1

B. n=3 to n=2

C. n=4 to n=1

D. n=2 to n=1

Answer:

Watch Video Solution

209. An electron in H-atom in M-shell on de-excitation to ground state gives maximum ..... spectrum lines.

A. 10

B. 6

C. 2

D. 1

Answer:

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210. If hydrogen atoms (in the ground state) are passed through an homogeneous magnetic field, the beam is split into two parts. This interaction with the magnetic field shows that the atoms must have magnetic moment. However, the moment cannot be due to the orbital

angular momentum since l=0. Hence one must assume existence of intrinsic angular momentum, which as the experiment shows, has only two permitted orientations.

Spin of the electron produce angular momentum equal to $S = \sqrt{s(s+1)}\,\frac{h}{2\pi}$ where $S = +\frac{1}{2}$.

Total spin of an atom $= +\frac{n}{2}$ or $-\frac{n}{2}$

where n is the number of unpaired electrons.

The substance which contain species with unpaired electrons in their orbitals behave as paramagnetic substances. The paramagnetism is expressed in terms of magnetic moment. The magnetic moment of an atom

$$\mu_s \sqrt{s(s+1)}\,\frac{eh}{2\pi mc} = \sqrt{\frac{n}{2}\left(\frac{n}{2}+1\right)}\,\frac{eh}{2\pi mc} \qquad s = \frac{n}{2}$$

$$\Rightarrow \mu_s = \sqrt{n(n+1)}\ \text{B.M.}$$

1. B.M. (Bohr magneton)$=\frac{eh}{4\pi mc}$

If magnetic moment is zero the substance is diamagnetic.

Which of the following ion has lowest magnetic moment?

A. Fe^{2+}

B. Mn^{2+}

C. Cr^{3+}

D. V^{3+}

Answer:

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211. If hydrogen atoms (in the ground state) are passed through an homogeneous magnetic field, the beam is split into two parts. This interaction with the magnetic field shows that the atoms must have magnetic moment. However, the moment cannot be due to the orbital angular momentum since l=0. Hence one must assume existence of intrinsic angular momentum, which as the experiment shows, has only two permitted orientations.

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$$\Rightarrow \mu_s=\sqrt{n(n+1)}\ \text{B.M.}$$

1. B.M. (Bohr magneton)=$\frac{eh}{4\pi mc}$

If magnetic moment is zero the substance is diamagnetic.

If an ion of $_(25)Mn$ has a magnetic moment of 3.873 B.M. Then oxidation state of Mn in ion is :

A. 2

B. 3

C. 4

D. 5

Answer:

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212. Ozone in the upper atmoshphere absorbs ultraviolet radiation which induces the following chemical reaction

$O_3(g) \rightarrow O_2(g) + O(g)$

O_2 produced in the above photochemical dissociation undergoes further dissociation into one normal oxygen atom (O) and more energetic oxygen atom $O*$.

$O_2(g) \rightarrow O + O*$

$(O*)$ has 1 eV more energy than(O) and normal dissociation energy of O_2 is 480 kJ mol^{-1}.

[1 eV/Photon =96 kJ mol^{-1}]

What is the maximum wavelength effective for the photochemical dissociation of O_2 molecule

A. 2440 Å

B. 2066.67 Å

C. 1000 Å

D. 155 Å

Answer:

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213. Ozone in the upper atmoshphere absorbs ultraviolet radiation which induces the following chemical reaction

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$O_2(g) \rightarrow O + O*$

$(O*)$ has 1 eV more energy than(O) and normal dissociation energy of O_2 is 480 kJ mol^{-1}.

[1 eV/Photon =96 kJ mol^{-1}]

If dissociation of O_3 into O_2 and O requires 400kJ mol^{-1} and O_(2) produced in this reaction is further dissociated to O and $O*$ then the total energy required to for the dissociation of O_3 into O and $O*$ is :

A. 1168kJ/mol

B. 976kJ/mol

C. 880kJ/mol

D. None of these

Answer:

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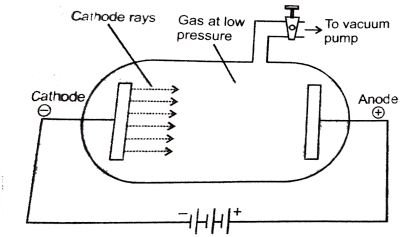
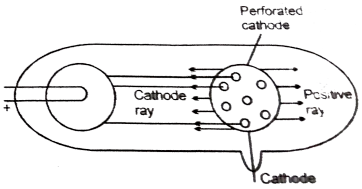
214. The existence of negatively charged particle in an atom was shown by J.J. Thomson as a result of the studies of the passage of electricity through gases at extremely low pressure known as discharge tube experiments. When a high voltage of the order of 10,000 volts or more was impressed across the electrodes, some sort of invisible rays moved from the negative electrode to the positive electrode these rays are called as cathode rays.



Cathode rays experiment



Anode rays experiment

Cathode rays travel in straight path in absence of electrical and magnetic field . Cathode rays consist of material part and charged particles? Cathode rays produce X-rays and light is emitted when they strike on ZnS screen. Cathode rays penetrate through thin sheets of aluminium and other metals . They affect the photogenic plate and passes heating effect when they strike on metal foil. The raito of charge to mass i.e charge/mass is same for all the cathode rays irrespective of the gas used in the tube.

The existence of positively charged particle in an atom was shown be E. Goldstein. He repeated the same discharge tube experiments by using a perforated cathode. It was observed that when a high potential difference was applied between the electrodes, not only cathode rays were produced but also a new type of rays were produced simultaneoulsy from anode moving towards cathode and passes through the holes or canal of the cathode. These termed as canal rays or anode rays.

These rays travel in straight lines and consists of positively charged particles. These rays have kinetic energy and produces heating effect also. The e/m ratio of these rays is smaller than that of electrons. Unlike cathode rays, their e/m value is dependent upon the nature of the gas taken in the tube. These rays produced flashes of light on ZnS screen and can pass throughs thin metal foils. They can produce physical and chemical changes and are capable to produce ionisation in gases.

For cathode rays the value of e/m:

A. is independent of the nature of the cathode and the gas filled in the discharge tube

B. is constant

C. is -1.7588×10^8 coulombs/g

D. all of the above are correct

Answer:

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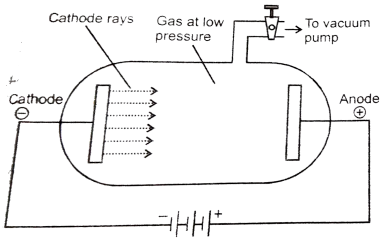
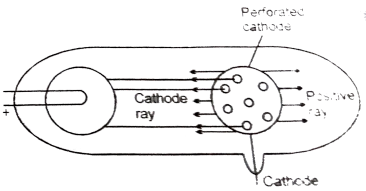
215. The existence of negatively charged particle in an atom was shown by J.J. Thomson as a result of the studies of the passage of electricity through gases at extremely low pressure known as discharge tube experiments. When a high voltage of the order of 10,000 volts or more was impressed across the electrodes, some sort of invisible rays moved from the negative electrode to the positive electrode these rays are called as cathode rays.



Cathode rays experiment



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Which is not true with respect to cathode rays?

A. A stream of electrons

B. Charged particles

C. Move with same speed as that of light

D. can be deflected by the electric field

Answer:

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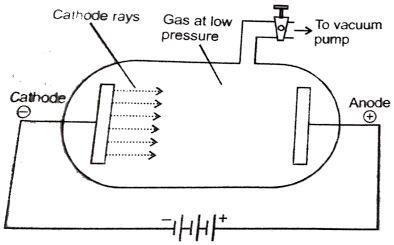
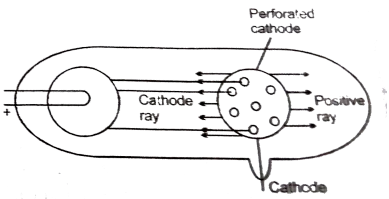


Cathode rays experiment



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chemical changes and are capable to produce ionisation in gases.

Select the incorrect statement.

A. Cathode rays has charged only and no mass

B. Anode rays are deflected by electrical and magnetic field

C. Canal rays is named for beam of positive charged particle

D. Anode rays particle carrying positive charge

Answer:

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217. Select the correct statemtnt (s):

A. The phenomena of diffraction of light can only be explained by assuming that light behaves as waves

B. de- Broglie postulate the dual character existed with matter

C. In atomic model Bohr considered electron as a particle

D. Wave nature of electrons was proved when diffraction rings were observed photographically when a stream of protons was passed through a metal foil

Answer:

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218. The angular momentum of electron can have the value (s) :

A. $0.5\frac{h}{\pi}$

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

C. $\frac{h}{0.5\pi}$

D. $2.5\frac{h}{2\pi}$

Answer:

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219. Select incorrect statement (s) :

A. Only three quantum numbers n, l and m are needed to define and orbital

B. Four quantum numbers are needed for complete discription of an electron

C. Two qnantum numbers n and l are needed to identify subshell and shape of orbital

D. Splitting of spectrum lines in presence of electric field is known as Zeeman effect

Answer:

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220. Select theh correct statement (s) :

A. An electron near the nucleus is attracted by the nucleus and has a low potential energy

B. Accoriding to Bohr's theory, an electron contiunously radiate energy if it stays in one orbit

C. Bohr's model could not explain the spectra of multielectron atoms

D. Bohr's modell was the first atomic model based on quantisation of energy

Answer:

Watch Video Solution

221. Choose the correct statement (s) :

A. The shape of an atomic orbital depends upon azimuthal quantum number

B. The orientation of an atomic orbital depends upon the magnetic quantum number

C. The energy of an eolectron in an atomic orbitals of multi-electron atom depends upon principle quantum number only

D. The number of degenerate atomic arbitals of one type depends upon the value of azimuthal quantum number

Answer:

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222. For radial probability curves. Which of the following is/are correct ?

A. The number of maxima in $2s$ orbital are two

B. The number of spherical or radial nodes is equal to n $-l-1$

C. The number of angular nodes are 'l'

D. $3d_z{}^2$has 3 angular nodes

Answer:

Watch Video Solution

223. Choose the incorrect statement (s) :

A. For a particlar orbital in hyderogen atom, the wave function may have negative value

B. Radial robability distribution function may have zero value but can never have nagative value

C. $3d_{x^2-y^2}$ orbital has two angular nodes and one radial node

D. yz and xz planes are nodal planes for d_{xy} orbital

Answer:

Watch Video Solution

224. Choose the correct statements among the following :

A. A node is a point in space where the wave-function Ψ has zero amplitude

B. The number of maxima (peaks) in radial probability distribution function is (n-l)

C. Radial probability density is $4\pi r^2 {R_n}^2{}_{,l}\ (r)$

D. Ψ^2 represents probability of finding electron

Answer:

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225. Select the correct statement (s) regarding $3p_y$ orbitl :

A. Total number of nodes are 2

B. Number of maxima in the curve $4\pi r^2 R^2$ vs r are two

C. quantum number n, l and m for an orbital may be $3, 1, -1$ respectively

D. The magnetic quantum number may have a positive value

Answer:

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226. Select the correct statement (s) :

A. In wave mechanical model, the energy of electron in the orbital remains constant

B. d_{xy} orbital is lies in yz plane

C. Nodal planes are yz and xy in $d_{x^2-y^2}$ orbital

D. Rest mass of photon is zero and increases with its velocity

Answer:

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227. Hydrogen has :

A. half filled subshell

B. half filled shell

C. one electron in valence sheel

D. half filled orbital

Answer:

Watch Video Solution

228. Select incorrect statement (s) :

A. If the value of $l = O$, the electron distribution is spherical

B. The shape of the orbital is given by magnetic quantum number

C. Angular momentum of $1s$, $2s$, 3, s orbit electrons are equal

D. In an atom, all the electrons travel with the same velocity

Answer:

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229. Select the correct statement (s) :

A. An orbital with l=O is symmetrical about the nucleus

B. An orbital with l = 1 is spherically summetrical about the nucles

C. $3d_{z^2}$is spherically summetrical about the z-axis

D. All are correct

Answer:

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230. Calculate the oxidation number of sulphur in H2SO3.

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231. Select the correct set (s) of quantum numbers

A. $n = 3, l = 0, m_l = -1$

B. $n = 3, l = 3, m_l = -2$

C. $n = 3, l = 2, m_l = -2$

D. $n = 3, l = 1, m_l = 0$

Answer:

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232. Which is /are correct statement ?

A. Number of subshell present in M-shell $= 3$

B. Number of orbitals present in N-shell $= 16$

C. $Cu^+ (z = 29)$ is paramagnetic

D. Zeeman effect explains splitting of spectral lines in magnetic field.

Answer:

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233. In a sample of H-atoms electrons are de-exicited from 4^{th} excited state to ground state. Which is/are correct statement ?

A. No line observed in P-fund series.

B. Total ten lines observed in spectrum.

C. 4 line in UV-region and 3 line in visible region observed.

D. One line observed in Brackkett series.

Answer:

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234. Column-I and Column-II contains fore entries each. Entries of Column-I are to be matched with some enties of Column-II One or more

than one entries of Column-I may have the matching with the same entries oc Column-II.

	ColumnI		ColumnII
(A)	Electron	(P)	Negetive charge
(B)	Proton	(Q)	Positive charge
(C)	Neutron	(R)	$1.6 \times 10^{-19} C$
(D)	Positron	(S)	Chargeless

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235. Write the iupac name of the element with atomic number 126

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236.

	ColumnI		ColumnII
(A)	$\frac{K.E.}{P.E.}$	(P)	2
(B)	$P.E + 2K.E.$	(Q)	$-\frac{1}{2}$
(C)	$\frac{P.E.}{T.E.}$	(R)	1
(D)	$\frac{K.E.}{T.E.}$	(S)	0

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	ColumnI		ColumnII
(A)	Lyman series	(P)	Visible region
(B)	Humphery series	(Q)	Ultraviolen region
(C)	Paschen series	(R)	Infrared region
(D)	Balmer series	(S)	Far infared region

237.

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238. In case of hydrogen spectrum wave number is given by

$$\bar{v} = R_H\left[\frac{1}{n_1^2} - \frac{1}{n_2^2}\right] \text{ where } n_1 > n_2$$

	ColumnI		ColumnII
(A)	Lyman series	(P)	$n_2 = 2$
(B)	Balmer series	(Q)	$n_2 = 3$
(C)	Pfund series	(R)	$n_2 = 6$
(D)	Brackett series	(S)	$n_2 = 5$

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	ColumnI (shell)	ColumnII (value of l)
	$(A) 2nd$	$(P) 1$
	$(B) 3rd$	$(Q) 2$
	$(C) 4th$	$(R) 3$
	$(D) 1st$	$(S) 0$

239.

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240.

	ColumnI	
(A)	The radial node of 5s atomic orbital is	(P)
(B)	The angular node of$3d_{yz}$atomic orbital is	(Q)
(C)	The sum of angular node and radial node of$4d_{xv}$atomic orbital	(R)
(D)	Theangular node of 3patomic orbital is	(S)

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241.

	ColumnI		ColumnII
(A)	The d-orbital which has two angular nodes	(P)	$3d_{x^2-y^2}$
(B)	The d-orbitial with two nodal surfaced from conce	(Q)	$3d_{s^2}$
(C)	The orbital without angular node	(R)	$4f$
(D)	The orbital which has three angular nodes	(S)	$3s$

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242.

	ColumnI		ColumnII
(A)	Orbital angular momentum of an electron	(P)	$\sqrt{s(s+1)}\frac{h}{2\pi}$
(B)	Angular momentum of an electron in an orbit	(Q)	$\sqrt{(n(n+2))}$
(C)	Spin angular momentum of an electron	(R)	$\frac{nh}{2\pi}$
(D)	Magnetic moment of atom	(S)	$\sqrt{\left(l(l+1)\frac{h}{2\pi}\right)}$

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243.

	ColumnI		ColumnII
(A)	Number of orbitials in thenn^{th}sheel	(P)	$2(2l+1)$
(B)	Maximum number of electrons in a subshell	(Q)	n
(C)	Number of subshell inn^{th}sheel	(R)	$2l+1$
(D)	Number of orbitals in a subshell	(S)	n^2

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244. Write rate of reaction for the following reaction N 2 +3H 2 ⇌2NH 3

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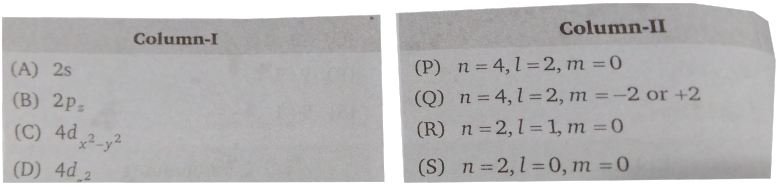
245. Match the following columns



Column-I	Column-II
(A) 2s	(P) $n=4, l=2, m=0$
(B) $2p_z$	(Q) $n=4, l=2, m=-2$ or $+2$
(C) $4d_{x^2-y^2}$	(R) $n=2, l=1, m=0$
(D) $4d_{z^2}$	(S) $n=2, l=0, m=0$

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246. Calculate the sigma and pi bond in but-2-ene?

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247. Express the following in scientific notation : 0.0025

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248. STATEMENT-1: The angular momentum of d-orbitals is $\sqrt{6}\frac{h}{2\pi}$

STATEMENT 2 : Angular momentum of electron in orbit is $mvr = \frac{nh}{2\pi}$

A. If both the statement are TRUE and STATEMENT-2 is the correct explanation of STATEMENT-1

B. If both the statements are TRUE but STATEMENT-2 is NOT the correct explanation of STATEMENT-1

C. If STATEMENT-1 is TRUE and STATEMENT-2 is FALSE

D. If STATEMENT-1 is FALSE and STATEMENT-2 is TRUE

Answer:

Watch Video Solution

249. STATEMENT-1: Angular momentum of the electron in the orbit which has four subshellis $\frac{2h}{\pi}$

STATEMENT-2: Angular momentum of electron is quantized.

A. If both the statement are TRUE and STATEMENT-2 is the correct explanation of STATEMENT-1

B. If both the statements are TRUE but STATEMENT-2 is NOT the correct explanation of STATEMENT-1

C. If STATEMENT-1 is TRUE and STATEMENT-2 is FALSE

D. If STATEMENT-1 is FALSE and STATEMENT-2 is TRUE

Answer:

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250. STATEMENT-1: Line emission spectra useful in the study of atomic. Structure.

STATEMENT-2: Each element has a unique line emission spectrum.

A. If both the statement are TRUE and STATEMENT-2 is the correct explanation of STATEMENT-1

B. If both the statements are TRUE but STATEMENT-2 is NOT the correct explanation of STATEMENT-1

C. If STATEMENT-1 is TRUE and STATEMENT-2 is FALSE

D. If STATEMENT-1 is FALSE and STATEMENT-2 is TRUE

Answer:

Watch Video Solution

251. STATEMENT-1: Emitted radiation will fall in visible trange when an electron jump from $n = 4 \rightarrow n = 2$ H-atom.

STATEMENT-2: Balmer series radiations belong to visible for hydrogen atom only.

A. If both the statement are TRUE and STATEMENT-2 is the correct explanation of STATEMENT-1

B. If both the statements are TRUE but STATEMENT-2 is NOT the correct explanation of STATEMENT-1

C. If STATEMENT-1 is TRUE and STATEMENT-2 is FALSE

D. If STATEMENT-1 is FALSE and STATEMENT-2 is TRUE

Answer:

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252. STATEMENT-1: Half-filled and fully-filled degenerate orbitals are more stable.

STATEMEHNT-2: Extra stabillity is due to the symmetrical distribution of electrons and exchange energy.

A. If both the statement are TRUE and STATEMENT-2 is the correct explanation of STATEMENT-1

B. If both the statements are TRUE but STATEMENT-2 is NOT the correct explanation of STATEMENT-1

C. If STATEMENT-1 is TRUE and STATEMENT-2 is FALSE

D. If STATEMENT-1 is FALSE and STATEMENT-2 is TRUE

Answer:

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253. Statement-I : The ground state configuration of Cr is $3d^5 4s^1$.

Because

Statement-II : A set of exactly half filled orbitals containing parallel spin arrangement provide extra stability.

A. If both the statement are TRUE and STATEMENT-2 is the correct explanation of STATEMENT-1

B. If both the statements are TRUE but STATEMENT-2 is NOT the correct explanation of STATEMENT-1

C. If STATEMENT-1 is TRUE and STATEMENT-2 is FALSE

D. If STATEMENT-1 is FALSE and STATEMENT-2 is TRUE

Answer:

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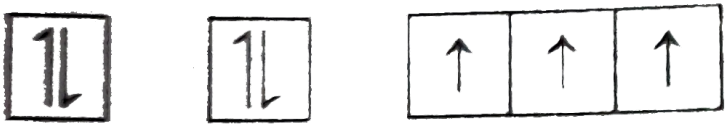
254. STATEMENT-1: The ground state electronic configuration of introgen



is

STATEMENT-2: Electronic are filled in orbitals as per aufbau principle, Hund's rule of maximum spin multiplicity and puli's principle.

A. If both the statement are TRUE and STATEMENT-2 is the correct explanation of STATEMENT-1

B. If both the statements are TRUE but STATEMENT-2 is NOT the correct explanation of STATEMENT-1

C. If STATEMENT-1 is TRUE and STATEMENT-2 is FALSE

D. If STATEMENT-1 is FALSE and STATEMENT-2 is TRUE

Answer:

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255. STATEMENT-1: An orbital cannot have more then two electrons and they must have opposite spins.

STATEMENT-2: No two electrojns in an atom can have same set of all the four quantum numbers as per Pauli's exclusion principle.

A. If both the statement are TRUE and STATEMENT-2 is the correct explanation of STATEMENT-1

B. If both the statements are TRUE but STATEMENT-2 is NOT the correct explanation of STATEMENT-1

C. If STATEMENT-1 is TRUE and STATEMENT-2 is FALSE

D. If STATEMENT-1 is FALSE and STATEMENT-2 is TRUE

Answer:

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256. STATEMENT-1: Orbital having xz plane as node may be $3d_{xy}$

STATEMENT-2: $3d_{xy}$ has zero radial node.

A. If both the statement are TRUE and STATEMENT-2 is the correct explanation of STATEMENT-1

B. If both the statements are TRUE but STATEMENT-2 is NOT the correct explanation of STATEMENT-1

C. If STATEMENT-1 is TRUE and STATEMENT-2 is FALSE

D. If STATEMENT-1 is FALSE and STATEMENT-2 is TRUE

Answer:

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257. STATEMENT-1: The kinetic energy of photo-electrons increases with increase in frequency of incident light were $v > v_o$.

STATEMENT-2: Whenever intenksity of light is increased the number of photo-electron ejected always increases.

A. If both the statement are TRUE and STATEMENT-2 is the correct explanation of STATEMENT-1

B. If both the statements are TRUE but STATEMENT-2 is NOT the correct explanation of STATEMENT-1

C. If STATEMENT-1 is TRUE and STATEMENT-2 is FALSE

D. If STATEMENT-1 is FALSE and STATEMENT-2 is TRUE

Answer:

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258. Assertion : Cu^{2+} ion is a coloured ion .

Reason : Every ion with unpaired electron is coloured .

A. If both the statement are TRUE and STATEMENT-2 is the correct explanation of STATEMENT-1

B. If both the statements are TRUE but STATEMENT-2 is NOT the correct explanation of STATEMENT-1

C. If STATEMENT-1 is TRUE and STATEMENT-2 is FALSE

D. If STATEMENT-1 is FALSE and STATEMENT-2 is TRUE

Answer:

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259. Given $r_{n+1} - r_{n-1} = 2r_n$, where $r_n - r_{n-1} = r_{n+1}$, are Bohr radius for hydrogen atom in n^{th}, $(n-1)^{th}$ shell respectively. Calculate the value of n.

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260. The energy of separationof an of an electron is $30.6eV$ moving in an orbit of Li^{+2} Find out the number of waves made by the electron in one complete revolution in the orbit

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261. Calculate the number of waves made by a Bohr electyron in one complete revolution in n^{th} orbit of H-atom, if ratio of de-Broglie wavelength asssociated with electron moving in n^{th} orbit and 2^{nd} orbit is 1.5.

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262. A certain day absorbs lights of $\lambda = 400$ nm and then fluorescence light of wavelength 500 nm. Assuming that under given condition $40\,\%$ of the absorbed energy is re-emitted as fluorescence, calculate the ratio of quanta absorbed to number of quanta emitted out.

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263. A photon of energy 4.5 eV strikes on a metal surface of work function $3.0eV$. If uncertainty in position is $\frac{25}{4\pi}\text{Å}$, find the uncertainty in measurement of de Broglie wavelength (in Å).

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264. Find out the difference in number of angular nodes and number of radial nodes in the orbital to whichlast electron of chromium present.

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265. What is the total number of radial and angular nodes present in 5f orbital ?

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266. Infrared lamps are used in restaurants to keep the food warm. The infrared radiation is strongly absorbed by water, raising its temperature and that of the food. If the wavelength of infrared radiationis assumed to be 1500 nm, and the number of quanta of infrared radiation produced per second by an infrared lamp (that consumes enregy at the rate of 100 W and is $12\,\%$ effcient only) is $\left(\times 10^{19}$, then the value of x is :

$\left(Given: h = 6.665 \times 10^{-34} J - s\right)$

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267. When an electron makes transition from $(n+1)$state to n state the wavelength of emitted radiations is related to n $(n > > > 1)$ according to $\lambda \propto n^x$.

What is the value of x ?

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268. For $3s$ orbital of hydrogen atom, the normalised wave function is

$$\Psi_{3s} = \frac{1}{(81)\sqrt{3\pi}}\left(\frac{1}{a_o}\right)^{3/2}\left[27 - \frac{18r}{a_o} + \frac{2r^2}{a_o^2}\right]e^{\frac{-r}{3a_o}}$$

If distance between the radial nodes is d, calculate the value of $\frac{d}{1.73a_o}$

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269. Find the separation between two electron (in$\mathring{A}$) in vacuum, if electrostatic potential energy between these electrons in $7.67 \times 10^{-19})J.$

[Given: e= $1.6 \times 10^{-19}C$ $\in_o = 8.85 \times 10^{-12}$ J^(-1)C^(2)m^(-1)$\pi = 3.14$]

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270. An α - [article moving with velocity $\frac{1}{30}$ th times of velocity of light. If unceratinty in position is $\frac{3.31}{\pi}$ pm, then minmum unceratinty in kinetic energy is $y \times 10^{-16}$ J. Calculate the value of y.

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271. In a sample of excited hydrogen atoms electrons make transition from $n = 2$ to $n = 1$. Emitted quanta strike on a metal of work function 4.2eV. Calculate the wavelength in A associated with ejected electron having maximum kinetic energy

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272. Calculate the value of A.

$A = \frac{E_{1.2}}{2E_{2,1}}$ where E_{nz}= Emergy of electron in n^{th} orbit, $Z =$ atomic number of hydrogen like species.

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Level 1

1. Which hybrid orbital is used by carbon atoms in the following molecules? CH3-CH3

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Level 2

1. A small piece of mass m moves in such a way the P.E. $=-\frac{1}{2}mkr^2$. Where k is a constant and r is the distance of the particle from origin. Assuming Bohr's model of quantization of angular momentum and circular orbit, r is directly proportional to :

A. n^2

B. n

C. $\sqrt{n}$

D. none of these

Answer:

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Others

1. Select the correct statement (s) :

A. Lower value of quantum number l indicates that there is a higher probability of finding the $3s$ electron close to the nucleus than those of $3p$ and $3d$ orbitals

B. Energy of $3s$ orbital is les than for the $3p$ and $3d$ orbitals

C. At the node, the vAlue of the radial function change from positive to negative

D. The radial function upon the quantum numbers n and l

Answer:

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2. Select the correct statement (s) :

A. Heisenberg's principle is applicable to stationary electron

B. Pauli,s exclusion principle is not applicable to photons

C. For and electron the product of velocity and principle quantum number will be independent to principle quantum number

D. Quantum numbers l and m determine the value of angular wave function

Answer:

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3. The radial distribution function $[P(r)]$ is used to determine the most probble radius, which is used to find the electron in a givenorbital. $\frac{dp(r)}{dr}$ for $1s$- orbital of hydrogen like atom having atomic number Z, is $\frac{dp}{dr} = \frac{4Z^3}{{a_o}^3}\left(2r\frac{2Zr^2}{a_o}\right)e^{-2zr/a_o}$:

Then which of the following sttements is/are correct ?

A. At the point of maximum value of radial distribution function $\frac{dp(r)}{dr} = 0$, one antionde is present

B. Most probable radius of $Li^{2+} is \frac{a_o}{3} \text{pm}$

C. Most probable radus of $He^{+} is \frac{a_o}{2} \text{pm}$

D. Most probable radius of hydrogen atom is a_o pm

Answer:

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4. select the correct statement (s)

A. Radial function $[R(r)]$ is a part of wave function which depends upon quantum number n the nucleus

B. Angular function depends only on the direction, and is independent to the distance form the nucleus

C. $\Psi^2(r, \theta, \Phi)$ is the probability density of finding the electronat a particular point in space

D. Radial distribution function $\left(4\pi r^2 R^2\right)$ gives the probability of the electrojn bering present at a distance r from the nucleus

Answer:

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

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6. In Bohr's model, for unielectronic atom, following symbols are used

$r_n z \rightarrow$ radius of n_{th} orbit with atomic number Z,

$U_{n,z}$ rarr Potantial energy of electron , $K_{n,z} \rightarrow$ Kinetic energy of electron ,

$V_{n,z} \rightarrow$ Volocity of electron , $T_{n,z} \rightarrow$ Time period of revolution

ColumnI	ColumnII
$(A) U_{1,2} : K_{1,1}$	$(P) 1:8$
$(B) r_{2,1} : r_{1,2}$	$(Q) -8:1$
$(C) V_{1,3} : V_{3,1}$	$(R) 9:1$
$(D) T_{1,2} : T_{2,2}$	$(S) 8:1$

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7. For an $4p_y$ orbital, there are nodal plane..... and azimuthal quantum number l.....

A. If both the statement are TRUE and STATEMENT-2 is the correct explanation of STATEMENT-1

B. If both the statements are TRUE but STATEMENT-2 is NOT the correct explanation of STATEMENT-1

C. If STATEMENT-1 is TRUE and STATEMENT-2 is FALSE

D. If STATEMENT-1 is FALSE and STATEMENT-2 is TRUE

Answer:

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8. Express the following in scientific notation : 234000

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