CHEMISTRY

BOOKS - S DINESH & CO CHEMISTRY (HINGLISH)

ATOMIC STRUCTURE

Multiple Choice Questions

1. What is wrong about anode rays?

A. Their e/m ratio is constant

B. They are deflected by electrical and magnetic field

C. They are produced by ionisation of molecules of the residual gas

D. Their e/m ratio depends on nature of residual

Answer: A

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2. Which of the following statement is incorrect?

A. The energy of radiation increases with decrease in wavelength

B. The spectrum of H atom is exactly same as that of He^{+} ion

C. Energy of radiation increases with increase in $\bar{\nu}$

D. The frequency of radiation is related to wave number as $\nu = C\bar{\nu}$.

Answer: B

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3. When a gold sheet is bombarded by a beam of $\alpha -$ particle, only a few of them get deflected whereas most go straight, undeflected. This is because :

A. the force of attraction on $\alpha -$ particles by the oppositely charged electron is not sufficient

B. the nucleus occupies much smaller volume as compared to the volume of atom

C. the force of repulsion on fast moving α-particles is very small

D. the neutrons in the nucleus do not have any effect on α-particles

Answer: B

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4. An electron is excited to fourth energy level in an atom. It will

A. remain there permanently

B. come back to original state either in one or more jumps

C. come back to ground state in one jump

D. rise to higher energy levels.

Answer: B

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5. Which of the following is not correct according to Planck's quantum theory ?

A. Radiations are associated with energy

B. Magnitude of energy associated with a quantum is equal to hv

C. Radiation energy is neither emitted not absorbed continuously

D. A body can emit less or more than a quantum of energy.

Answer: D

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6. Which of the following statements concerning light is false?

A. It is a form of energy

B. It cannot be deflected by a magnet

C. It consists of photons of same energy

D. It is a part of electromagnetic spectrum.

Answer: C

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7. Which of the following statements is wrong? The probability of finding the electron in p_x orbital is

A. maximum on two opposite sides of the nucleus along x-axis

B. zero at the nucleus

C. same on all the sides around the nucleus

D. zero on the z-axis.

Answer: C

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8. In unielectron system, the wave number of any spectral line is directly proportional to

A. the number of particles present in the system

B. the velocity of electron undergoing transition

C. $\frac{1}{n_1^2} - \frac{1}{n_2^2}$

D. the charge on the nucleus and the λ of light used.

Answer: C

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9. One among the following statements is correct?

A. An orbital containing an electron having quantum numbers $n = 2, l = 0, s = +1/2$ is spherical

B. The frequency of X-rays is less than radiowaves

C. All photons have same energy

D. As intensity of light increases, the frequency increases.

Answer: A

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10. The conclusion that every additional electron enters the orbital with lowest possible energy has been drawn from

A. Pauli's exclusion principle

B. Hund's rule

C. Aufbau principle

D. de-Broglie's equation.

Answer: C

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11. Bohr's model of atom is not in agreement with

A. Line spectra of hydrogen atom

B. Pauli's principle

C. Planck's theory

D. Heisenberg's principle

Answer: D

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12. Which of the following statement is correct?

A. All electromagnetic radiations do not possess the same velocity

B. Matter waves are associated with electrical and magnetic fields

C. Matter waves and electromagnetic radiations are alike

D. The velocity of matter wave is generally less than that of light.

Answer: D

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13. Which of the following statements is correct?

A. The different energy levels are equally spaced

B. The energy of the electron decreases as the value of n increases

C. Energy of the electron in an atom is negative

D. Bohr's theory explains the spectrum of multi-electron atoms.

Answer: C

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14. Which experimental observation correctly account for the phenomenon ?

A.

Experimental observation	Phenomenon
X-rays spectra	Charge on nucleus

B.

Experimental observation	Phenomenon
α − particle scattering	Quantized electron orbit

C.

Experimental observation	Phenomenon
Photoelectric effect	The nuclear atom

D.

Experimental observation	Phenomenon
Emission spectra	Quantization of energy

Answer: D

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15. In the Schrodinger's wave equation Ψ represents

A. orbit

B. wave function

C. wave

D. radial probability

Answer: B

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16. Which of the following gave the idea of nucleus of the atom ?

A. Oil drop experiment

B. Davisson and Germer's experiment

C. α-ray scattering experiment

D. Austen's mass spectrogram experiment.

Answer: C

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17. Cathode rays have same charge to mass ratio as

A. α-particles

B. β-rays

C. Anode rays

D. Protons

Answer: B

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18. Which of the following statements is/are correct ?

A. Isotopes have same number of nucleus

B. Isobars have same number of protons

C. Isotones have same number of neutrons

D. Isobars are atoms of different elements with same isotopic number

Answer: C

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19. According to Bohr's Model of hydrogen atom

A. Total energy of the electron is quantized

B. Angular momentum of the electron is quantized and given as $\sqrt{l(l+1)}.\ \frac{h}{2\pi}$

C. Both (A) and (B)

D. None of the above

Answer: C

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20. Rutherford's experiment established that

A. inside the atom there are positive centres immersed in sea of electrons

B. nucleus contains protons, neutrons and mesons

C. most of the space in an atom is empty

D. All A, B and C

Answer: C

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21. Mathematically, Heisenberg's uncertainty principle can best be explained by

A. $\Delta x \times \Delta p \geq \frac{h}{\pi}$

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

C. $\Delta x \times \Delta p \geq \frac{h}{4\pi}$

D. $\Delta x \geq \frac{\Delta p \times h}{4\pi}$

Answer: C

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22. The correct Schrodinger's wave equation for an 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. $\frac{\partial^2 \Psi}{\partial x^2} + \frac{\partial^2 \Psi}{\partial y^2} + \frac{\partial^2 \Psi}{\partial z^2} + \frac{8\pi m^2}{h^2}(E - V)\Psi = 0$

Answer: C

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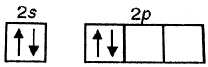
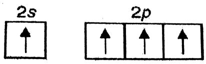
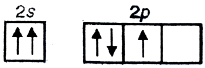
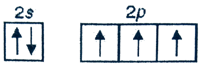
23. In which of the following electron distribution in ground state, only the Hund's rule is violated?

A. (A) 

B. (B) 

C. (C) 

D. (D) 

Answer: A

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24. Heisenherg's uncertainty principle rules out the exact simultaneous measurment of:

A. probability and intensity

B. energy and velocity

C. charge density radius

D. position and velocity.

Answer: D

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25. Which of the following expressions imposes the condition of quantization of energy of an electron in an atom ?

A. $E = mc^2$

B. E = h v

C. $\lambda = \frac{h}{mv}$

D. $mvr = \frac{nh}{2\pi}$

Answer: D

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26. The total number of electrons in a principal energy shell is designated by expression

A. n

B. $2n+1$

C. n^2

D. $2n^2$

Answer: D

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27. The total number of electrons in a subshell designated by azimuthal quantum number, l is given as

A. $2l + l$

B. l^2

C. $4l + 2$

D. $2l + 2$

Answer: C

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28. According to Bohr's theory the angular momentum of an electron in the fourth orbit is

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

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

C. $\frac{3h}{2\pi}$

D. $\frac{3h}{\pi}$

Answer: B

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29. wave mechanical model of the atom depends upon:

A. de-Broglie's concept of duality

B. Uncertainty principle

C. Schrodinger's wave equation

D. All the above

Answer: D

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30. The conclusion that orbital can accommodate only two electrons is derived from

A. Heisenberg's principle

B. Aufbau rule

C. Pauli's exclusion principle

D. Hund's rule

Answer: C

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31. The average distance of electron from the nucleus in an atom is of the order of

A. 1 cm

B. $10^{-13} cm$

C. $10^{-8} cm$

D. 1 mm

Answer: C

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32. A region in space around the nucleus of an atom where the probability of finding the electron is maximum is called

A. sub-level

B. orbit

C. orbital

D. electron shell

Answer: C

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33. According to Bohr's model of the atom, an electron can revolve around the atomic nucleus in a suitable orbit without emitting energy if its orbit

A. is a perfect circle

B. is a circle with a large radius

C. houses a whole number of de-Broglie waves

D. houses odd number of de-Broglie waves.

Answer: C

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34. Which of the following statement concerning Bohr's model is false ?

A. Predicts that probability of electron near nucleus is more

B. Angular momentum of electron in H atom $= \frac{nh}{2\pi}$

C. Introduces the idea of stationary states

D. Explains line spectrum of hydrogen.

Answer: A

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35. The kinetic energy of the electron in the nth orbit of an atom is given by the relation

A. $-\frac{4\pi^2 me^4}{n^2h^2}$

B. $-\frac{2\pi^2 me^4}{n^2h^2}$

C. $-\dfrac{2\pi^2 me^4}{n^2h^2}$

D. None of these

Answer: C

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36. The de-Broglie equation suggests that an electron has

A. Particle character

B. Wave character

C. Particle as well as wave

D. None of the above statements are true.

Answer: C

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37. According to Bohr's atomic model

A. electron on H atom can have only certain values of angular momentum

B. electrons have a particle as well as wave character

C. atomic spectrum of atom should contain only five lines

D. all the above statements are correct

Answer: A

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38. The transition of electron in H atom that will emit maximum energy is

A. $n_3 \rightarrow n_2$

B. $n_4 \rightarrow n_3$

C. $n_5 \rightarrow n_4$

D. $n_6 \rightarrow n_5$

Answer: A

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39. The limiting line Balmer series will have a frequency of

A. $3.29 \times 10^{15} s^{-1}$

B. $3.65 \times 10^{14} s^{-1}$

C. $8.22 \times 10^{14} s^{-1}$

D. $9.22 \times 10^{14} s^{-1}$

Answer: C

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40. Which of the following configuration is incorrect ?

A. $1s^2 2s^2 2p_x^2 2p_y^2 2p_z^0$

B. $1s^2 2s^2 2p_x^1 2p_y^1 2p_z^0$

C. $1s^2 2s^2 2p_x^1 2p_y^1 2p_z^1$

D. $1s^2 2s^2 2p^6 3s^2 3p^6 3d^5 4s^1$

Answer: A

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41. The wavelngth fo a spectrl line for an electronic transition is inversely related to :

A. Z (nuclear charge)

B. velocity of electron

C. number of electrons undergoing transition

D. the energy difference between the enregy levels involving transition.

Answer: D

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42. The phenomenon of splitting of spectral lines under the influence of the electric field is known as

A. Photoelectric effect

B. Stark effect

C. Zeeman effect

D. Electromagnetic effect

Answer: B

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43. The electronic configuration of $_(46)Pd$ is :

A. $1s^2 2s^2 2p^6 3s^2 3p^6 3d^{10} 4s^2 4d^8 5s^2$

B. $1s^2 2s^2 2p^6 3s^2 3p^6 3d^{10} 4s^2 4p^6 4d^{10} 5s^0$

C. $1s^2 2s^2 2p^6 3s^2 3p^6 3d^{10} 4s^2 4p^6 4d^9 5s^1$

D. $1s^2 2s^2 2p^6 3s^2 3p^6 3d^{10} 4s^2 4p^6 4d^8 5s^2 5p^6$

Answer: B

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44. In H atom when electron jumps from 1s to 2s orbital,

A. energy is released

B. energy and absorbed

C. the atom becomes cation

D. size of the atom decreases

Answer: B

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45. If the energy of electron in H atom is given by expression $-\frac{1312}{n^2} kJ\text{mole}^{-1}$ then the energy required to excite the electron from ground state to second orbit is

A. 328 kJ

B. 656 kJ

C. 984 kJ

D. 1312 kJ

Answer: C

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46. In the atomic spectrum of hydrogen, the spectral lines pertaining to electronic transition of n = 4 to n = 2 refers to

A. Lyman lines

B. Balmer lines

C. Paschen lines

D. Brackett lines.

Answer: B

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47. When electronic transition occurs from higher energy state to lower energy state with energy difference equal to ΔE electron volts, the wavelength of the line emitted is approximately equal to

A. $\dfrac{12397}{\Delta E} \times 10^{-10} m$

B. $\dfrac{12397}{\Delta E} \times 10^{10} m$

C. $\dfrac{12397}{\Delta E} \times 10^{-10} cm$

D. $\dfrac{12397}{\Delta E} \times 10^{10} cm$

Answer: A

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48. In hydrogen spectrum, the series of lines appearing in ultra violet region of electromagnetic spectrum are called

A. Balmer lines

B. Lyman lines

C. Pfund lines

D. Brackett lines.

Answer: B

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49. If ionization energy of H atom is 13.6 eV, then the second ionization energy of He should be-

A. $13.6eV$

B. $27.2eV$

C. $54.4eV$

D. Cannot be predicted

Answer: C

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50. The first line in the Balmer series in the H atom will have the frequency

A. $4.57 \times 10^{14} s^{-1}$

B. $3.29 \times 10^{15} s^{-1}$

C. $8.22 \times 10^{15} s^{-1}$

D. $8.05 \times 10^{13} s^{-1}$

Answer: A

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51. The orbital configuration of $._{24}Cr$ is $3d^5 4s^1$. The number of unpaired electrons in $Cr^{3+}(g)$ is

A. 3

B. 2

C. 1

D. 4

Answer: A

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52. When $3d$ orbital is complete, the new electron will enter the

A. 4p-orbital

B. 4s-orbital

C. 4d-orbital

D. None of these

Answer: A

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53. When 3p orbitals are completely filled then, the newly entering electron goes into

A. 4p

B. 3d

C. 4s

D. 4d

Answer: C

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54. How many electrons in $._{19}K$ have $n = 3, l = 0$?

A. 1

B. 2

C. 4

D. 3

Answer: B

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55. The maximum number of 3d electrons having spin quantum number $s = +\frac{1}{2}$ are

A. 10

B. 14

C. 5

D. any number from 1 to 10

Answer: C

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56. The maximum number of electrons in s, p and d-subshell are

A. 2 in each

B. 2, 4 and 6

C. 2, 6 and 10

D. 2, 6 and 12

Answer: C

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57. In which of the following all the electrons are paired?

A. Atom with atomic number 22

B. Nitride ion

C. Atom with configuration $3s^2 3p^4$

D. In all

Answer: B

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58. In an atom which has 2K, 8L, 8M and 2N electrons in the ground state, the total number of electrons having l=1 are

A. 20

B. 8

C. 12

D. 10

Answer: C

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59. The valence electrons of $._{29}Cu$ lie in the

A. K shell

B. M shell

C. N shell

D. both M and N shell

Answer: C

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60. The number of electrons that can be accommodated in d_{xy} orbital is

A. 10

B. 4

C. 1

D. 2

Answer: D

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61. Th electroniv configuration of Mn can be written as

A. $[Ar]4s^2$

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

C. $[Ar]3d^5, 4s^1$

D. $[Ar]3d^5, 4s^2$

Answer: D

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62. The penultimate shell of Francium (Z = 87) has the configuration

A. $2s^2 2p^6$

B. $6s^2 6p^6$

C. $4s^2 4p^6 4d^{10} 4f^{14}$

D. $5s^2 5p^6 5d^{10}$

Answer: B

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63. Which of the following sets of quantum number is not possible for 23rd electron of Cr (At. no. 24)?

A. 3, 2, +2, -1/2

B. 3, 2, +2, +1/2

C. 3, 2, +1, +1/2

D. 3, 1, +1, +1/2

Answer: B

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64. How many quantum numbers are required to define the electron in atom?

A. two

B. three

C. one

D. four

Answer: D

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65. Which d-orbital does not have four lobes?

A. $d_{x^2-y^2}$

B. d_{xy}

C. d_{yz}

D. d_z^2

Answer: D

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66. The total number of electrons present in any main energy level can be calculated from

A. $(2l+1)$

B. $2n^2$

C. $(2n+1)$

D. n^2

Answer: B

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67. Which of the following sets of quantum number is allowable

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

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

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

D. $n=2, l=1, m=0, s=0$

Answer: A

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68. Which shape is associated with the orbital designated by $n = 2, l = 1$?

A. spherical

B. tetrahedral

C. dumb-bell

D. pyramidal

Answer: C

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69. Which of the following sets of quantum numbers is impossible arrangement?

A. $n=3, m=-2, s=+\frac{1}{2}$

B. $n=4, m=3, s=+\frac{1}{2}$

C. $n=5, m=2, s=-\frac{1}{2}$

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

Answer: D

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70. Which of the following statement about quantum numbers is wrong ?

A. If the value of $l = 0$, the electron distribution is spherical

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

C. The Zeeman's effect is explained by magnetic quantum number

D. The spin quantum number gives the orientations of electron cloud.

Answer: D

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71. The shape of the orbital with the value of $l = 2$ and $m = 0$ is

A. spherical

B. dumb-bell

C. trigonal planar

D. square planar.

Answer: B

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72. The total number of subshells in nth main energy level are

A. n^2

B. $2n^2$

C. $(n-1)$

D. n

Answer: D

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

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

B. $n=4, l=3, m=-3, s=-\frac{1}{2}$

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

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

Answer: C

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74. The possible sub-shell in $n = 3$ energy shell are :

A. s,p,d

B. s,p,d,f

C. s, p

D. s only

Answer: A

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75. If the value of m for an electron is +3. It may be found in

A. 4s-orbitals

B. 4p-orbitals

C. In any f-orbital

D. In any d-orbital

Answer: C

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76. The two electron have the following sets of quantum number

$X: 3, 2, -2, +1/2$

$Y: 3, 0, 0, +1/2$

What is true of the following

A. X and Y have same energy

B. X and Y have unequal energy

C. X and Y represent same electron

D. None of the statements is correct

Answer: B

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77. Which of the following orbital does not make sense ?

A. 3d

B. 3f

C. 5p

D. 7s

Answer: B

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78. If the value of azimuthal quantum number of an electron is 2, then which of the following values of magnetic quantum numbers is not permissible,

A. 3

B. 2

C. 0

D. 1

Answer: A

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79. The quantum number which is related to the orbital angular momentum is

A. subsidiary quantum number

B. principal quantum number

C. magnetic quantum number

D. spin quantum number

Answer: A

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80. The total number of orbitals in fifth energy level should theoretically be

A. 10

B. 25

C. 15

D. 18

Answer: B

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81. The value of azimuthal quantum number for electrons present in 6p-orbitals is

A. 2

B. 1

C. any of the values between 0 and 5

D. 0

Answer: B

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82. Which of the following is the correct set of quantum numbers for the outer shell electrons of $._{21}Sc$

A. $3, 2, 0, +\frac{1}{2}$

B. $4, 0, 0, +\frac{1}{2}$

C. $3, 0, 0, -\frac{1}{2}$

D. $40, -1, +\frac{1}{2}$

Answer: B

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83. Which of the following properties of an element is a whole number ?

A. Atomic mass

B. Mass number

C. Atomic size

D. Ionisation potential

Answer: B

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84. Which of the following scientists developed equation E = hv? (v= frequency)

A. Einstein

B. Schrodinger

C. Max Planck

D. Newton

Answer: C

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85. An isotone of ${}_{32}Ge^{76}$ is

(i) ${}_{32}Ge^{77}$

(ii) ${}_{33}As^{77}$

(iii) ${}_{34}Se^{77}$

(iv) ${}_{34}Se^{78}$

A. only (i) & (ii)

B. only (ii) & (iii)

C. only (ii) & (iv)

D. (ii), (iii) & (iv)

Answer: C

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86. The fundamental particle which are responsible for keeping nucleons together is

A. Meson

B. Antiproton

C. Positron

D. Electron

Answer: A

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87. The atoms in which X are equal are called isotones. Here, X is

A. atomic number

B. mass number

C. electron

D. neutrons

Answer: D

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88. An atom which does not have any neutron is

A. deutrium

B. tritium

C. helium

D. hydrogen

Answer: D

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89. $._{6}^{14}C, ._{6}^{12}C$ differ from each other in number of

A. electrons

B. photons

C. protons

D. nucleons

Answer: D

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90. Atom consist of electrons , protons and neutrons . If the mass attributed to neutron were halved and that attributed to the electrons were doubled , the atomic mass of $6C^{12}$ would be approximately :

A. remain approximately the same

B. be doubled

C. approximately be halved

D. be reduced by approximately 25%

Answer: D

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

A. An electron

B. A proton

C. An α-particle

D. All will have same value of wavelength

Answer: C

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92. Ne, Na^{+} and F^{-} have the same

A. mass number

B. number of nucleons

C. number electrons

D. number of protons

Answer: C

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93. Which of the following species has more number of electrons in comparison with the neutrons?

A. Al^{3+}

B. $O^{2\,-}$

C. $F^{\,-}$

D. C.

Answer: B

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94. The number of spherical nodes in $4s$ orbital is

A. 4

B. ∞

C. 2

D. 3

Answer: D

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95. Which of the following orbitals does not have the angular node ?

A. p_x-orbital

B. d_z^2-orbital

C. p_v-orbital

D. 1s-orbital

Answer: D

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96. Which of the following do not travel with the speed of light?

A. Gamma rays

B. X-rays

C. de-Broglie waves

D. Both (B) and (C)

Answer: C

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97. How many electron in an atom with atomic number 105 can have $(n + l) = 8$?

A. 30

B. 17

C. 15

D. Unpredictable

Answer: B

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98. The haviest subatomic particle is

A. neutron

B. positron

C. electron

D. proton

Answer: A

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99. The size of the nucleus is approximately

A. 1/100th of atom

B. 1/1000th of the atom

C. 1/10000th of the atom

D. 1/100000th of the atom

Answer: D

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100. Wavelength of Radiowaves is :

A. $<$ microwaves

B. $>$ microwaves

C. $\leq$ infrared waves

D. $\leq$ ultra violet rays.

Answer: B

Watch Video Solution

101. The line spectrum of two elements is not identical because

A. they donot have same number of neutrons

B. they have dissimilar mass number

C. they have different energy level schemes

D. they have different number of valence electrons

Answer: C

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102. Bohr's atomic model can expalin the spectrum of

A. hydrogen atoms only

B. atoms or ions which are unielectron

C. atoms or ions which have only two electrons

D. hydrogen molecule.

Answer: B

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103. Correct set of four quantum numbers for the valence (outermost) electron of rubidium $(Z = 37)$ is

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

B. $4, 3, 2, -\frac{1}{2}$

C. $5, 1, 0, -\frac{1}{2}$

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

Answer: A

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104. The electronic configuration of a dipositive ion M^{2+} is 2, 8, 14 and its mass number is 56. The number of netrons present is

A. 32

B. 42

C. 30

D. 34

Answer: C

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105. The transition of electron from n = 3 to n = 1 in H atom produces

A. Emission spectrum

B. Absorption spectrum

C. Paschen line

D. Pfund line.

Answer: A

Watch Video Solution

106. The number of degenerate f-orbitals in any quantum level is

A. 7

B. 14

C. 4

D. 10

Answer: A

Watch Video Solution

107. The magnatic quantum number for the valence electron of Caesium (atomic number 55) is

A. 3

B. 0

C. -3

D. Any number between $+3$ to -3.

Answer: B

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108. Which of the following is wrong?

A. Cathode rays have constant e/m ratio

B. e/m ratio of anode rays is not constant

C. e/m ratio of protons is not constant

D. e/m ratio of β-particles is constant.

Answer: C

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109. In excited H atom, when electron drop from $n = 4, 5, 6$ to $n = 1$, there is emission of

A. U.V. light

B. Visible light

C. I.R. light

D. Radio waves.

Answer: A

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110. An electron of mass m and charge -e moves in circular orbit of radius r round the nucleus of charge +Ze in unielectron system. In CGS system the potential energy of electron is

A. $\frac{+Ze^2}{r^2}$

B. $\frac{-Ze^2}{r}$

C. $\frac{Ze^2}{2r}$

D. $-\frac{Ze^2}{2r}$

Answer: B

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111. When two electron are placed in two degenerate orbitals of the atom , the energy is lower if their spin is parallel .The statement is based upon

A. Pauli's exclusion principle

B. Bohr's rule

C. Hund's rule

D. Aufbau principle

Answer: C

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112. Which value of l will represent double dumb-bell shape of the orbital?

A. 0

B. 1

C. 2

D. l does not give shape of orbital.

Answer: C

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113. An atom has 2K, 8 L, 11 M, 2N electrons, the total number of s-electrons will be

A. 6

B. 8

C. 10

D. 4

Answer: B

Watch Video Solution

114. The total number of orbitals in energy level represented by n = 5 are

A. 16

B. 50

C. 30

D. 25

Answer: D

Watch Video Solution

115. In an atom with 2K, 6L, 1M and 2N eletrons the number of electrons with m = 0, $s = +\frac{1}{2}$ are

A. 2

B. 7

C. 8

D. 16

Answer: B

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116. For an orbital with n = 2, l = 1, m = 0 there is/are

A. one planar node

B. one region of maximum probability

C. two lobes of same size about the nucleus

D. all the above statements are correct

Answer: D

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117. Which of the following orbitals is cyclindrically symmetrical about x-axis?

A. p_z-orbital

B. p_y-orbital

C. p_x-orbital

D. d_{xz}-orbital

Answer: C

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118. For a sub-shell with azimuthal quantum number 'l', the total values of magnetic quantum number m can be related to l as

A. $m = (l + 2)$

B. $m = (2l^2 + 2)$

C. $l = \frac{(m - 1)}{2}$

D. $l = 2m + 1$

Answer: C

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119. An orbital with $l = 0$ is

A. symmetrical about X-axis only

B. symmetrical about Y-axis only

C. spherical symmetrical

D. unsymmetrical

Answer: C

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120. Which of the following orbitals does not have angular node?

A. 2s

B. 2p

C. 3p

D. 3d

Answer: A

Watch Video Solution

121. Which orbital notation does not have spherical node?

A. n = 2, l = 0

B. n = 2, l = 1

C. n = 3, l = 0

D. n = 3, l = 0

Answer: B

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122. In the emission of photo-electrons, the number of photo-electrons emitted per unit time depends upon the

A. Energy of incident radiations

B. Frequency of incident radiations

C. Intensity of incident radiations

D. None of the above

Answer: C

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123. The kinetic energy of the photoelectrons does not depends upon

A. intensity of incident radiation

B. frequency of incident radiations

C. wavelength of incident radiation

D. wave number of incident radiation.

Answer: A

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124. The units for equation $\lambda = \frac{h}{mv}$ are

A. $\frac{kgm^2s^{-1}}{kgms^{-1}}$

B. $\frac{kgms^{-1}}{ms^{-1}}$

C. $\frac{kg^2m^2s^{-2}}{kgm^2s^{-1}}$

D. $\frac{kg^2ms^{-3}}{kgm}$

Answer: A

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125. The momentum of a photon of frequency $50 \times 10^{17}s^{-1}$ is nearly

A. $1.1 \times 10^{-23}kgms^{-1}$

B. $3.33 \times 10^{-43}kgms^{-1}$

C. $2.27 \times 10^{-40}kgms^{-1}$

D. None of these

Answer: A

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126. A cricket ball of $0.5 kg$ moving with a velocity of $100 ms^{-1}$. The wavelength associated with its motion is

A. $1/100 cm$

B. $6.6 \times 10^{-34} m$

C. $1.32 \times 10^{-35} m$

D. $6.6 \times 10^{-28} m$

Answer: C

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127. A near U.V. photon of 300 nm is absorbe by a gas is red then remitted as two photons. One photon is red with wavelength 760 nm. Hence wavelength of the second photon is

A. 460 nm

B. 1060 nm

C. 496 nm

D. 300 nm

Answer: C

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128. The transitions $He^{\oplus}$ ion that would have the same wavelength as the first Lyman line in hydrogen spectrum is

A. $2 \rightarrow 1$

B. $5 \rightarrow 3$

C. $4 \rightarrow 2$

D. $6 \rightarrow 4$

Answer: C

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129. The work function of a metal is $4.2eV$. If radiation of $2000\tilde{A}$ fall on the metal then the kinetic energy of the fastest photoelectron is

A. $1.6 \times 10^{-19} J$

B. $16 \times 10^{10} J$

C. $3.2 \times 10^{-19} J$

D. $6.4 \times 10^{-10} J$

Answer: C

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130. A certain metal when irradiated to light $(v = 3.2 \times 10^{16} Hz)$ emits photoelectrons with twice kinetic energy as did photoelectrons when the same metal is irradiation by light $(v = 2.0 \times 10^{16} Hz)$. The v_0

(Threshold frequency) of the metal is

A. $1.2 \times 10^{14} Hz$

B. $8 \times 10^{15} Hz$

C. $1.2 \times 10^{16} Hz$

D. $4 \times 10^{12} Hz$

Answer: B

Watch Video Solution

131. The ratio of the radii of the first three Bohr orbit in H atom is

A. $1 : \frac{1}{2} : \frac{1}{3}$

B. $1:2:3$

C. $1:4:9$

D. $1:8:27$

Answer: C

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132. An electron with velocity v is found to have a certain value of de Brogle wavelength .The velocity that the muetron should process to have the same de Broglie wavelength is

A. v

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

C. $1840v$

D. $\frac{1840}{v}$

Answer: B

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133. The momentum of a particle associated with de-Broglie's wavelength of 6Å is

A. $1.1 \times 10^{-24} kgms^{-1}$

B. $1.1 \times 10^{34} kgms^{-1}$

C. $39.6 \times 10^{-34} kgms^{-1}$

D. $39.6 \times 10^{-24} kgms^{-1}$

Answer: A

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134. Frequency of matter wave is equal to

A. $(K.E.)/2h$

B. $2.(K.E.)/h$

C. $(K.E./h)$

D. λ

Answer: B

Watch Video Solution

135. If threshold wavelength (λ_0) for ejection of electron from metal is 330 nm, then work function for the photoelectron emission is

A. $1.2 \times 10^{-18} J$

B. $1.2 \times 10^{-20} J$

C. $6 \times 10^{-19} J$

D. $6 \times 10^{-12} J$

Answer: C

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136. The mass of one mole of electron is

A. $9.1 \times 10^{-28} g$

B. $0.55mg$

C. $9.1 \times 10^{-24}g$

D. $1.008mg$

Answer: B

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137. In two H atoms A and B the electrons move around the nucleus in circular orbits of radius r and 4r respectively. The ratio of the times taken by them to complete one revolution is

A. $1:4$

B. $1:2$

C. $1:8$

D. $2:1$

Answer: C

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138. Which of the following species will produce the shortest wavelength for the transition $n = 2$ to $n = 1$?

A. H atom

B. D atom

C. He^{+} ion

D. Li^{2+} ion

Answer: D

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139. The energy required to dislodge electron from excited isolated H-atom $(IE_1 = 13.6 eV)$ is

A. $= 13.6 eV$

B. $> 13.6 eV$

C. < 13.6 and $> 3.4 eV$

D. $\leq 3.4 eV$

Answer: D

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140. Velocity of electron in the first orbit of H-atom as compared to that of velocity of light is approximately

A. $\frac{1}{1000}th$

B. $\frac{1}{137}th$

C. $\frac{1}{10}th$

D. same

Answer: B

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141. How many electron in copper atom $(._{29}Cu)$ have $(n+l)=4$

A. 6

B. 7

C. 8

D. 4

Answer: B

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142. In any subshell, the maximum 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: C

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143. For a certain particle, it is found that uncertainty in velocity is reciprocal of uncertainty in position. This implies that

A. Mass of the particle is $>$ unity

B. Mass of the particle is unity

C. Mass of the particle $\leq$ h

D. Mass of the particle $\geq h / 4\pi$.

Answer: D

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144. How many electron in K (Z =19) have n = 4, l = 0 ?

A. 1

B. 2

C. 3

D. 4

Answer: A

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145. Suggest two transitions in hydrogen spectrum for which the number ratio is 108:7

A. $2 \rightarrow 1, 3 \rightarrow 1$

B. $2 \rightarrow 1, 4 \rightarrow 3$

C. $2 \rightarrow 1, 5 \rightarrow 4$

D. $2 \rightarrow 1, 3 \rightarrow 1$

Answer: B

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146. The ratio of kinetic energy and potential energy of an electron in a Bohr orbit of a hydrogen $-$ like species is :

A. $1:2$

B. $-1:2$

C. $1:1$

D. $-1:1$

Answer: B

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147. For particles having same K.E., the de-Broglie wavelength is

A. Directly proportional to its velocity

B. Inversely proportionals to its velocity

C. Independent of its mass and velocity

D. Unpredictable

Answer: A

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148. In one joule of energy, the number of photons with have number equal to x is

A. $(hcx)^{-1}$

B. $x(hc)^{-1}$

C. hcx

D. $hc(x)^{-1}$

Answer: A

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149. Which of the expression given below gives IE of H atom in terms of Rydberg's constant (R_H)?

A. $R_H.\,hc$

B. $R_H N_A.\,hc$

C. $R_H(2hc)$

D. $R_H.\,c$

Answer: A

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150. One unpaired electron causes magnetic moment of 1.1 BM. The magnetic moment of $_(26)Fe^{2+}$ is

A. 4.4

B. 5.5

C. 2.2

D. 0

Answer: A

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151. If numerical value of mass and velocity are equal then de Broglie wavelength in terms of K.E. is

A. $\frac{mh}{2K.\,E.}$

B. $\frac{vh}{2K.\,E}$

C. Both are correct

D. None is correct

Answer: C

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152. If uncertainty in position are velocity are equal the uncertainty in momentum will be

A. $\frac{1}{2}\sqrt{\frac{mh}{\pi}}$

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

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

D. $\frac{mh}{4\pi}$

Answer: A

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153. Number of waves made by a Bohr electron in one complete in its fourth orbit is

A. 2

B. 3

C. 4

D. Infinite.

Answer: C

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154. Which electronic transition in a hydrogen atom releases the greatest amount of energy?

A. n = 1 to n = 2

B. n = 2 to n = 4

C. n = 3 to n = 6

D. $n = \infty$ to n = 1

Answer: A

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155. how fast is an electron moving if it has a wavelength equal to the distance traveled in one second ?

A. $\sqrt{h/m}$

B. $\sqrt{m/h}$

C. $\sqrt{h/p}$

D. $\sqrt{h/2(K.E.)}$

Answer: A

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156. If uncertainties in the measurement of position and momentum are equal, then uncertainty in the measurement of velocity is

A. $\frac{1}{2}\sqrt{\frac{mh}{\pi}}$

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

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

D. None of these

Answer: C

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157. Energy equivalent of $10.00cm^{-1}$ is

A. $19.9 \times 10^{-23} J$ per photon

B. $28.6 \times 10^{-3} Kcalmol^{-1}$ photon

C. $12.0 \times 10^{-2} kJmol^{-1}$ photon

D. All are correct

Answer: D

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158. The ratio of energy of the electron in ground state of hydrogen to the electron in first excited state of Be^{3+} is

A. $1:4$

B. $1:8$

C. $1:16$

D. $16:1$

Answer: A

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159. The shortest wavelength of H-atom in Lyman series is x, then longest wavelength in Balmer series of He^{+} is

A. $\frac{9x}{5}$

B. $\frac{36x}{5}$

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

D. $\frac{5x}{9}$

Answer: A

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160. The radius of first Bohr orbit is x, then de-Broglie wavelength of electron in 3rd orbit is nearly

A. $2\pi y$

B. $6\pi y$

C. 9x

D. $x / 3$

Answer: B

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Revision Questions

1. Whith 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: A

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2. Indicate which electronic configuration amongst the following correctly represent SULPHUR atom ?

A. $1s^2 2s^2 2p^6 3s^2 3p^2 3d^2$

B. $1s^2 2s^2 2p^6 3s^2 3p^2 4s^2$

C. $1s^2 2s^2 2p^6 3s^2 3p^6 4s^1 4p^1$

D. $1s^2 2s^2 2p^6 3s^2 3p^4$

Answer: D

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3. The credit of discovering neutron goes to

A. Rutherford

B. Langmuir

C. Chadwick

D. Austen

Answer: C

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4. Cathode rays are

A. Electromagnetic waves

B. Radiations

C. Stream of α-particles

D. Stream of electrons.

Answer: D

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5. The mass of the neutron is of the order of

A. $10^{-23} kg$

B. $10^{-24} kg$

C. $10^{-26} kg$

D. $10^{-27} kg$

Answer: D

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6. The electrons present in K-shell of the atom will differ in

A. principal quantum number

B. azimuthal quantum number

C. magnetic quantum number

D. spin quantum number

Answer: D

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7. The magnetic quantum number specifies.

A. size of the orbital

B. spin angular momentum

C. orbital angular momentum

D. spatial orientation of orbital

Answer: D

Watch Video Solution

8. The ratio of ionization energy of H and Be^{+3} is.

A. $1 : 1$

B. $1 : 3$

C. $1 : 9$

D. $1 : 16$

Answer: D

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9. No two electrons in an atom will have all the four quantum numbers same. This statement is known as

A. Exclusion principle

B. Uncertainty principle

C. Hund's rule

D. Aufbau principle

Answer: A

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10. The maximum number of electrons that can be taken by a subshell with $l = 3$ is

A. 14

B. 10

C. 8

D. 4

Answer: A

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11. The number of electrons in the M shell of the element with atomic number 24 is

A. 24

B. 12

C. 13

D. 8

Answer: C

Watch Video Solution

12. The value of Planck's constant is

A. $6.6256 \times 10^{-27} ergs$

B. $66.256 \times 10^{-27} ergs$

C. $6.02 \times 10^{-15} ergs$

D. $3.01 \times 10^{-23} ergs$

Answer: A

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13. Two electrons occupying the same orbital are distinguished by :

A. principal quantum number

B. azimuthal quantum number

C. magnetic quantum number

D. spin quantum number

Answer: D

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14. The symbol of the element whose atoms have the outer most electronic configuration $2s^2 2p^3$ is

A. N

B. Li

C. P

D. Na

Answer: A

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15. The principal quantum number, n describes

A. Shape of orbital

B. Sub-shell of electron

C. Main energy shell of electron

D. Spin of electron

Answer: C

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16. The quantum numbers for the outer electrons of an atom are given by

$n = 2, l = 0, m = 0, s = +1/2$

A. Lithium

B. Beryllium

C. Hydrogen

D. Boron

Answer: A

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17. When electrons revolve in stationary orbits,

A. there is no change in energy level

B. they become stationary

C. they are gaining kinetic energy

D. there is increase in energy

Answer: A

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18. $._{11}^{22}Na$ contains

A. 22 protons

B. 11 neutrons

C. 22 neutrons

D. None of these

Answer: B

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19. Which quantum number is sufficient to describe the electron in hydrogen atom?

A. l

B. n

C. m

D. s

Answer: B

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20. For a given principal level $n = 4$ the energy of its subshells is of the odrer

A. $s < d < f < p$

B. $s < p < d < f$

C. $d < f < p < s$

D. $s < p < f < d$

Answer: B

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21. Which one of the following shows the correct electronic configuration of the outermost shell in inert gases ?

A. ns^2, np^6

B. ns^2, np^3

C. ns^2, np^5

D. ns^2, np^4

Answer: A

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22. The valence orbital configuration of an element with atomic number 23 is

A. $3d^5$

B. $3d^3, 4s^2$

C. $3d^3, 4s^1, 4p^1$

D. $3d^2, 4s^2, 4p^1$

Answer: B

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23. The electronic configuration of $1s^2 2s^2 2p^6 3s^2 3p^2$ corresponds to

A. Si

B. S

C. Na

D. Ar.

Answer: A

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24. The maximum number of electrons in p-orbital with n = 6, m = 0 is

A. 2

B. 6

C. 10

D. 14

Answer: A

Watch Video Solution

25. The number of netrons in the element Be is

A. 4

B. 5

C. 9

D. 13

Answer: B

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26. When the azimuthal quantum number $l = 1$, the shape of the orbital will be

A. spherical

B. dumb-bell

C. double dumb-bell

D. more complicated

Answer: B

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27. The spectrum of He is expected to be similar to that of

A. Hydrogen

B. Li^{+}

C. Na

D. He

Answer: A

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28. Sodium chloride imparts a yellow colour to the Bunsen flame .This can be interpreted due to the

A. low ionization energy of sodium

B. sublimation of metallic sodium to give yellow vapour

C. emission of excess energy absorbed as a radiation in the visible region

D. photosensitivity of sodium

Answer: C

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29. The exact path of electron $2p$ orbital cannot be determined the above statement is based upon

A. Hund's Rule

B. Bohr's rule

C. Uncertainty principle

D. Aufbau principle

Answer: C

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30. For the energy levels in an atom , which one of the following statement is correct ?

A. There are seven principal electron energy levels

B. The second principal energy level has four sub-energy levels and contain a maximum of eight electrons

C. The principal energy level N can have a maximum of 32 electrons

D. The 4s sub-energy level hs high energy than 3d sub-energy level.

Answer: C

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31. Subsidiary quantum number specifies

A. Size of orbital

B. Shape of orbital

C. Orientations stability

D. Nuclear stability

Answer: B

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32. As we move away from nucleus, the energy of orbit

A. decreases

B. increases

C. remains constant

D. None of these

Answer: B

Watch Video Solution

33. The spectrum of He is expected to be similar to that of

A. H

B. Li^{+}

C. Na

D. He^{+}

Answer: B

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

A. $4l - 2$

B. $4l + 2$

C. $2l + 1$

D. $2n^2$

Answer: B

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35. The atomic numbers of Ni and Cu are 28 and 29 respectively. The electronic configuration

$1s^2 2s^2 2p^6 3s^2 3p^6 3d^{10}$ represents

A. Cu^+

B. Cu^{2+}

C. Ni^{2+}

D. Ni

Answer: A

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36. The correct set of quantum numbers for the unpaired electron of chlorine atom is

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

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

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

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

Answer: C

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

A. $n=3, l=0, m=\ -1$

B. $n=3, l=2, m=\ +1$

C. $n=3, l=2, m=\ -1$

D. $n=3, l=2, m=0$

Answer: A

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38. The number of spherical nodes in 3p orbitals are

A. one

B. three

C. none

D. two

Answer: A

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39. No two electrons in atom can have

A. the same principal quantum numbers

B. the same azimuthal quantum number

C. the same magnetic quantum number

D. an identical set of four quantum numbers.

Answer: D

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40. Number of neutrons in heavy hydrogen atom is

A. 0

B. 1

C. 2

D. 3

Answer: B

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41. If r is radius of first orbit , the radius of nth orbit of the H atom will be

A. rn^2

B. rn

C. r / n

D. r^2n^2

Answer: A

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42. The energy of a hydrogen atom in its ground state is $-13.6eV$. The energy of the level corresponding to the quantum number n=5 is

A. $-0.54eV$

B. $-5.40eV$

C. $-0.85eV$

D. $-2.72eV$

Answer: A

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43. At $200^{\circ}C$, hydrogen molecules have velocity $2.4 \times 10^5 cms^{-1}$ The de Broglie wavelength in this case is approximately

A. 2Å

B. 1000Å

C. 100Å

D. 10Å

Answer: A

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44. An electron has a spin quantum number $+1\frac{1}{2}$ and a magnetic quantum number -1. It cannot be present in

A. d-orbital

B. f-orbital

C. p-orbital

D. s-orbital

Answer: D

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45. The electronic configuration of an atom/ion can be defined by the following

A. Aufbau principle

B. Pauli's exclusion principle

C. Hund's rule

D. All the above

Answer: D

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46. The number of electrons in 3d shell foe element with atomic number 26 is

A. 4

B. 6

C. 8

D. 10

Answer: B

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47. The value of Planck's constant in SI unit is

A. $6.6 \times 10^{-32} gm^2 \sec$

B. $6.6 \times 10^{-34} kgm^2 \sec^{-1}$

C. $6.6 \times 10^{-33} kgm \sec^{-1}$

D. $6.6 \times 10^{-34} gm^2 \sec$

Answer: B

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48. The total number of possible values of magnetic quantum number for the value of $l = 3$ is

A. 3

B. 1

C. 5

D. 7

Answer: D

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49. If the value of principal quantum number is 3, the total possible values for magnetic quantum number will be

A. 1

B. 4

C. 9

D. 12

Answer: C

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

A. Pauli's exclusion principle

B. Aufbau rule

C. Hund's rule

D. Slater rules

Answer: C

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51. The quantum number values for the designation 3d are

A. $n = 2, m = \ -3$

B. $n = 3, m = 3$

C. $n = 4, m = 1$

D. $n = 3, m = 2$

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52. The electron in an atom

A. moves randomly around the nucleus

B. has fixed space around the nucleus

C. is stationary in various energy levels

D. moves around its nucleus in definite energy levels.

Answer: D

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53. Electronic configuration calcium atom can be written as

A. $[Ne], 4p^2$

B. $[Ar], 4s^2$

C. $[Ne], 4s^2$

D. $[Kr], 4p^2$

Answer: D

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54. The ground state configuration of Fe^{3+} ion in gaseous state is: (At. No. of Fe = 26)

A. $[Ar]^{18} 3d^3 4s^2$

B. $[Ar]^{18} 3d^6 4s^2$

C. $[Ar]^{18} 3d^5$

D. $[Ar]^{18} 3d^6$

Answer: B

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55. If the uncertainty in the position of an electron is zero the uncertainty in its momentum be

A. zero

B. $\geq \frac{h}{4\pi}$

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

D. infinite.

Answer: D

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56. The radius of second Bohr's orbit is

A. $0.053nm$

B. $0.053 / 4nm$

C. $0.053 \times 4nm$

D. $0.053 \times 20nm$

Answer: C

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57. Cathode rays are

A. electromagnetic waves

B. stream of α-particles

C. stream of electrons

D. stream of positrons

Answer: C

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58. Atomic number is equal to the

A. number of neutrons in the nucleus

B. number of protons in the nucleus

C. sum of protons and neutrons

D. atomic mass of the element

Answer: B

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

A. $3, 2, 1, 1/2$

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

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

D. $5, 0, 0, 1/2$

Answer: B

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

A. Li^{+} and He^{+}

B. Cl^{-} and Ar

C. Na and K

D. F^{+} and Ne.

Answer: B

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61. The set of quantum number not applicable to an electron

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

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

C. $1, 0, 0, \ -\frac{1}{2}$

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

Answer: A

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62. Which of the following electronic configuration is not possible?

A. $1s^2, 2s^2, 2p^6$

B. $1s^2, 2s^2, 2p^7$

C. $1s^2, 2s^2$

D. $1s^2, 2s^2, 2p^5$

Answer: B

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63. The uncertainty in the position of an electron moving with a velocity of $1 \times 10^4 cms^{-1}$ (accurate up to 0.011%) will be :

A. $1.92cm$

B. $7.68m$

C. $0.528cm$

D. $3.84cm$

Answer: C

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64. The radus of hydrogen atom in the ground state $0.53\tilde{A}....$ The radius of Li^{2+} ion (Atomic number = 3) in a similar state is

A. $1.06Å$

B. $0.265Å$

C. $0.17Å$

D. $0.53Å$

Answer: C

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65. The splitting of line into groups under the effect of magnetic field is called

A. Stark effect

B. Zeeman effect

C. Photoelectric effect

D. None of these

Answer: B

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66. Azimuthal quantum number of last electron of $._{11}Na$ is

A. 1

B. 2

C. 3

D. 0

Answer: D

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67. Azimuthal quantum number determines the

A. size

B. spin

C. orientation

D. angular momentum of orbitals

Answer: D

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68. Rutherford's experiment led to the discovery of

A. Nucleus

B. Electron

C. Proton

D. α-particle

Answer: A

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69. Electronic configuration of $._{29}Cu$ in ground state is :

A. $1s^2 2s^2 2p^6 3s^2 3p^6 3d^{10} 4s^1$

B. $1s^2 2s^2 2p^6 3s^2 3p^5 3d^{11} 4s^1$

C. $1s^2 2s^2 2p^6 3s^2 3p^6 3d^9 4s^2$

D. $1s^2 2s^2 2p^6 3s^2 3p^5 3d^{10} 4s^2$

Answer: A

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70. The number of d electrons in Fe^{2+} (atomic number of $Fe = 26$) is not equal to that of the.

A. p-electrons in $._{10}Ne$

B. s-electrons in $._{12}Mg$

C. d-electrons in Fe

D. p-electrons in Cl^{-}

Answer: C

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71. The radius of the atom is of the order of

A. $10^{-10}cm$

B. $10^{-13} cm$

C. $10^{-15} cm$

D. $10^{-18} cm$

Answer: D

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72. Maximum number of orbitals is given shell identified by the principal quantum number n is equak to

A. $2n$

B. $2n^2$

C. n^2

D. $n+1$

Answer: C

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73. The configuration $1s^2 2s^2 2p^5 3s^1$ shows

A. ground state of fluorine

B. excited state of fluorine

C. excited state of neon atom

D. excited state of neon atom

Answer: C

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74. Electronic configuration of $._{21}\,Sc$ is

A. $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^1$

B. $1s^2 2s^2 2p^6 3s^2 3p^6 4s^1 3d^2$

C. $1s^2 2s^2 2p^6 3s^2 3p^6 4s^0 3d^3$

D. $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^2$

Answer: A

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75. Which of the following expressions gives the de-Broglie relationship?

A. $\dfrac{h}{mv} = p$

B. $\lambda = \frac{h}{mv}$

C. $\lambda = \frac{h}{mp}$

D. $\lambda m = \frac{v}{p}$

Answer: B

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76. Which of the following is electronic configuration of $Cu^{2+}(Z = 29)$?

A. $[Ar]4s^1 3d^8$

B. $[Ar]4s^2 3d^{10} 4p^1$

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

D. $[Ar]3d^9$

Answer: D

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77. Which of the following orbitals have a dumb bell shape?

A. s

B. p

C. d

D. f

Answer: B

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78. Which of the following scientists demonstrated the wave nature of electron ?

A. Schrodinger

B. Davisson

C. de-Broglie

D. Heisenberg

Answer: C

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79. The quantum number which determines the shape of the orbital is

A. principal

B. azimuthal

C. magnetic

D. spin

Answer: B

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80. The uncertainty in momentum of an electron is $1 \times 10^{-5} kg - m/s$. The uncertainty in its position will be $(h = 6.62 \times 10^{-34} kg = m^2/s)$.

A. $1.05 \times 10^{-28} m$

B. $1.05 \times 10^{-26} m$

C. $5.27 \times 10^{-30} m$

D. $5.25 \times 10^{-28} m$

Answer: C

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81. If the radius of first Bohr orbit be a_0, then the radius of the third orbit would be-

A. $3 \times a_0$

B. $6 \times a_0$

C. $9 \times a_0$

D. $1/9 \times a_0$

Answer: C

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82. The correct ground state electronic configuration of chromium atom(Z=24) is :

A. $[Ar]3d^5 4s^1$

B. $[Ar]3d^4 4s^2$

C. $[Ar]3d^6 4s^0$

D. $[Ar]4d^5 4s^1$

Answer: A

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83. An electron has principal quantum number 3. The number of its (i) sub-shell and (ii) orbitals would be respectively.

A. 3 and 5

B. 3 and 7

C. 3 and 9

D. 2 and 5

Answer: C

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84. The uncertainty principle and the concept of wave nature of matter were proposed by............and ....respectively.

A. Heisenberg, de-Broglie

B. de-Broglie, Heisenberg

C. Heisenberg, Planck

D. Planck, Heisenberg

Answer: A

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85. The first emission line of Balmer series in H spectrum has the wave number equal to :

A. $\frac{9R}{400}cm^{-1}$

B. $\frac{7R}{144}cm^{-1}$

C. $\frac{3R}{4}cm^{-1}$

D. $\frac{5R}{36}cm^{-1}$

Answer: D

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86. The four quantum number of the valence electron of potassium are.

A. $4, 1, 1, 1/2$

B. $4, 0, 0, 1/2$

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

D. $4, 4, 0, 1/2$

Answer: B

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87. An α-particle is identical with

A. Proton

B. Neutron

C. Helium nucleus

D. Electron.

Answer: C

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88. Heaviest particle is

A. Meson

B. Neutron

C. Proton

D. Electron

Answer: B

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89. The ratio of specific charge of an $\alpha -$ particle to that of a proton is

A. $2:1$

B. $1:2$

C. $1:4$

D. $1:1$

Answer: B

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

A. $1s^2 2s^2 2p^6 3s^2 3p^6 3d^5$

B. $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^5$

C. $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^7$

D. $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^6$

Answer: D

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91. Which of the following has more number of unpaired d-electrons ?

A. Zn^+

B. Fe^{2+}

C. Ni^{3+}

D. Cu^{+}

Answer: B

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92. Who modified Bohr's theory of introducing elliptical orbits for electron path?

A. Hund

B. Thomson

C. Rutherford

D. Sommerfield

Answer: D

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93. The de-Broglie wavelength of a particle with mass $1g$ and velocity $100m / \sec$ is.

A. $6.63 \times 10^{-33}m$

B. $6.63 \times 10^{-34}m$

C. $6.63 \times 10^{-35}m$

D. $6.65 \times 10^{-35}m.$

Answer: A

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94. Which of the following sets of quantum numbers represents the highest energy of an atom?

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

B. $n = 3, l = 0, m = 0, s = +\frac{1}{2}$

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

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

Answer: D

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95. If wavelength of photon is $2.2 \times 10^{-11} m$, $h = 6.6 \times 10^{-34} Js$, then momentum of photons is

A. $3 \times 10^{-23} kgms^{-1}$

B. $3.33 \times 10^{2} kgms^{-1}$

C. $1.452 \times 10^{-44} kgms^{-1}$

D. $6.89 \times 10^{43} kgms^{-1}$

Answer: A

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96. The energy of a photon is given as, $\Delta E/\text{atom} = 3.03 \times 10^{-19} J\text{atom}^{-1}$ then, the wavelength (λ) of the photon is

A. $65.6 nm$

B. $656 nm$

C. $0.656nm$

D. $6.56nm$

Answer: B

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97. Which of the following is not possible ?

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

B. $n = 3, l = 1, m = -1$

C. $n = 2, l = 0, m = -1$

D. $n = 2, l = 1, m = -1$

Answer: C

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98. Which of the following represents noble gas configuration?

A. $1s^2 2s^2 2p^6 3s^2 3p^6 3d^{10} 4s^2 4p^6 4d^{10} 5s^2 5p^6$

B. $1s^2 2s^2 2p^6 3s^2 3p^6 3d^{10} 4s^2 4f^{14} 5s^2 5p^6 5d^1$

C. $1s^2 2s^2 2p^6 3s^2 3p^6 3d^{10} 4s^2 4p^6 4d^{10} 5s^2 5p^6 5d^1 6s^2$

D. $1s^2 2s^2 2p^6 3s^2 3p^6 3d^{10} 4s^2 4p^6 4d^{10} 5s^2 5p^6 5d^6 6s^2$

Answer: A

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99. The electronic configuration of the outemost shell of the most electronegative element is

A. $1s^2.2s^2.2p^4.3s^1$

B. $1s^2.2s^2.2p^6.3s^2.3p^5$

C. $1s^2.2s^2.2p^5$

D. $1s^2.2s^2.2p^6.3s^1.\ 3p^8$

Answer: C

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100. 1 erg of energy corresponds to

A. $6.02 \times 10^{23} J/mol$

B. $6.02 \times 10^{16} J / mol$

C. $1 \quad \mathrm{erg} / \mathrm{mol}$

D. $10^{-7} J / mol$

Answer: B

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101. The element with electronic configuration of its atom $1s^2.2s^2.2p^6.3s^2.3d^{10}.4s^1$ is

A. Fe

B. Co

C. Ni

D. Cu

Answer: D

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102. According to Bohr's theory, the energy required for the transition of H atom from n = 6 to n = 8 state is

A. equal to energy required for the transition from n = 5 to n = 7 state

B. larger than in (A)

C. less than in (A)

D. equal to energy for the transition from n = 7 to n = 9 state

Answer: C

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103. A 4f orbital has

A. one node

B. two nodes

C. three nodes

D. four nodes

Answer: C

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104. The equation. $\Delta x . \Delta p \geq h / 4\pi$ shows

A. de-Broglie relation

B. Heisenberg's uncertainty principle

C. Aufbau principle

D. Hund's rule

Answer: B

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105. An electron has kinetic energy $2.8 \times 10^{-23} J$ de-Broglie wavelength will be nearly.

$(m_e = 9.1 \times 10^{-31} kg)$.

A. $9.28 \times 10^{-4} m$

B. $9.28 \times 10^{-7} m$

C. $9.28 \times 10^{-8} m$

D. $9.28 \times 10^{-10} m$

Answer: C

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106. What will be de Broglie's wavelength of an electron moving with a velocity of $1.2 \times 10^{5} ms^{-1}$?

A. 6.068×10^{-9}

B. 3.133×10^{-37}

C. 6.626×10^{-9}

D. 6.018×10^{-7}

Answer: A

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107. The total number of orbitals possible for the quantum number n is

A. n

B. n^2

C. 2n

D. $2n^2$

Answer: B

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108. Which of the following has same number of electrons in te last shell?

A. As and B

B. Sn and Pb

C. N and O

D. Fe and Cr

Answer: B

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109. In which of the following pairs, the number of electrons in the outermost shell are different?

A. As, Sb

B. Ge, Sn

C. In, Pt

D. Se, Te

Answer: C

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110. The wavelength associated with a gold weighing $200g$ and moving at a speed of $5m/h$ is of the order :-

(a). $10^{-10}m$

(b). $10^{-20}m$

(c).$10^{-30}m$

(d). $10^{-40}m$

A. $10^{-15}m$

B. $10^{-20}m$

C. $10^{-35}m$

D. $10^{-25}m$

Answer: C

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111. The third line of the Balmer series, in the emission spectrum of the hydrogen atom, is due to the transition from the

A. fourth Bohr orbit to the first Bohr orbit

B. fifth Bohr orbit to the second Bohr orbit

C. sixth Bohr orbit to the third Bohr orbit

D. seventh Bohr orbit to the third Bohr orbit

Answer: B

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112. The correct set of quantum numbers for 4d-electrons is

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

B. 4,2,1,0

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

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

Answer: D

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113. The highest number of unapired electrons are present in

A. Fe^{0}

B. Fe^{4+}

C. Fe^{2+}

D. Fe^{3+}

Answer: D

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114. The nineteenth electron of chromium has which of the following set of quantum number?

A. $\begin{array}{cccc} n & l & m & s \\ 3 & 0 & 0 & 1/2 \end{array}$

B. $\begin{array}{cccc} n & l & m & s \\ 3 & 2 & -2 & 1/2 \end{array}$

C. $\begin{array}{cccc} n & l & m & s \\ 4 & 0 & 0 & 1/2 \end{array}$

D. $\begin{array}{cccc} n & l & m & s \\ 4 & 1 & -1 & 1/2 \end{array}$

Answer: C

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115. Rutherford's model suggests the existence of

A. Atom

B. Nucleus

C. α-particle

D. Mesons

Answer: B

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116. For how many orbitals are the quantum numbers $n = 3, l = 2, m = +2$ possible?

A. 1

B. 2

C. 3

D. 4

Answer: A

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117. In the ground state, an element has 13 electrons in its M shell. The element is

A. Copper

B. Chromium

C. Nickel

D. Iron

Answer: B

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

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

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

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

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

Answer: B

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119. Which is not true with respect to the cathode rays ?

A. A stream of electrons

B. Charged particles

C. Move with speed as that of light

D. Can be deflected by magnetic fields

Answer: C

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120. An element M has an atomic mass 19 and atomic number 9. Its ion is represented by

A. M^{+}

B. m^{2+}

C. M^{-}

D. M^{2-}

Answer: C

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121. Rutherford's α particle dispersion experiment concludes that

A. All positive ions are deposited at small part

B. All negative ions are deposited at small part

C. Proton moves around the electron

D. Neutrons are charged particles.

Answer: A

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122. Which of the following element's outermost orbit's last electron has magnetic quantum number $m = 0$?

A. Na

B. O

C. Cl

D. N

Answer: A

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123. which of the following ions has the maximum magnetic moment ?

A. Mn^{2+}

B. Fe^{2+}

C. Ti^{2+}

D. Cr^{2+}

Answer: A

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124. The spectrum of He is expected to be similar to that of

A. H

B. Na

C. He^{+}

D. Li^+

Answer: D

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125. Chloride ion and potassium ion are isoelectronic. Then

A. their sizes are same

B. chloride ion is bigger than potassium ion

C. potassium is relatively bigger

D. depends on the other cation or anion

Answer: B

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126. For f-orbital, the values of m are

A. $-2, -1, 0, +1, +2$

B. $-3, -2, -1, 0, +1, +2, +3$

C. $-1, 0, +1$

D. $0, +1, +2, +3$

Answer: B

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127. The correct orders of increasing energy of atomic orbitals is

A. $5p < 4f < 6s < 5d$

B. $5p < 6s < 4f < 5d$

C. $4f < 5p < 5d < 6s$

D. $5p < 5d < 4f < 6s$

Answer: B

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128. Which of the following is not isoelectronic ?

A. Na^{+}

B. Mg^{2+}

C. O^{2-}

D. Cl^{-}

Answer: D

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129. As the nuclear charge increases from neon to calcium, the orbital energies

A. increases

B. increase rapidly

C. increase very slowly

D. fall

Answer: D

130. The value of the energy for the first excited state of hydrogen will be

A. $-13.6eV$

B. $-3.40eV$

C. $-1.51eV$

D. $-0.85eV$

Answer: B

131. In hydrogen atom, energy of first excited state is $-3.4eV$. Then, KE of the same orbit of hydrogen atom is.

A. $+3.4eV$

B. $+6.8eV$

C. $-13.6eV$

D. $+13.6eV$

Answer: A

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132. The energy of the first electron in helium will be

A. $-13.6eV$

B. $-54.4eV$

C. $-5.44eV$

D. zero.

Answer: B

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133. In a hydrogen atom, if energy atom, if energy of an electron in group state is $-13.6eV$, then that in the 2^{nd} excited state is :

A. $1.51eV$

B. $3.4eV$

C. $6.04eV$

D. $13.6 eV$

Answer: A

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134. In the Bohr's orbit, what is the ratio of total kinetic energy and total energy of the electron

A. -1

B. -2

C. 1

D. $+2$

Answer: A

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135. The configuration $1s^2 2s^2 2p^5 3s^1$ shows

A. Excited state of O_2^-

B. Excited state of neon

C. Excited state of fluorine

D. Ground state of flurine atom.

Answer: B

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136. The ratio between kinetic enegry and total enegry of the electrons of hydrogen atom according to Bohr's model

is

A. $2:1$

B. $1:1$

C. $1:\ -1$

D. $1:2$

Answer: C

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137. The value of Planck's constant is $6.63 \times 10^{-34} Js$. The velocity of light is $3.0 \times 10^{8} ms^{-1}$. Which value is closest to the wavelength in nanometers of a quantum of light with frequency $8 \times 10^{15} s^{-1}$?

A. 3×10^{7}

B. 2×10^{25}

C. 5×10^{-18}

D. 4×10^{1}

Answer: D

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138. In Bohr series of lines of hydrogen spectrum, third line from the red end corresponds to which one of the following inner orbit jumps of electron for Bohr orbit in atom in hydrogen :

A. $3 \rightarrow 2$

B. $5 \rightarrow 2$

C. $4 \rightarrow 1$

D. $2 \rightarrow 5$

Answer: B

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139. The de-Broglie wavelength of a tennis ball mass $60g$ moving with a velocity of $10m$ per second is approximately :

A. 10^{-33} metres

B. 10^{-31} metres

C. 10^{-16} metres

D. 10^{-25} metres

Answer: A

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140. The orbital angular momentum for an electron revolving in an orbit is given by $\sqrt{l(l+1)}\frac{h}{2\pi}$. What is the momentum of an s-electron?

A. $+\frac{1}{2}\cdot\frac{h}{2\pi}$

B. zero

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

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

Answer: B

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141. The number of d-electrons retained in Fe^{2+} (At. no. of Fe = 26) ions is

A. 3

B. 4

C. 5

D. 6

Answer: D

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

A. $\frac{2\pi}{nh}$

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

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

D. nh

Answer: C

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143. Configuration of $5p^1$ is

A. $n = 5, l = 1$

B. $n = 4, l = 1$

C. $n = 4, l = 0$

D. $n = 5, l = 0$

Answer: A

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144. Number of orbitals present in 3rd shell is

A. 1

B. 3

C. 9

D. 18

Answer: C

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145. RUTHERFORD'S NUCLEAR MODEL OF ATOM

A. spiral

B. circular

C. Both

D. None

Answer: B

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146. Rutherford's model suggests the existence of

A. atoms

B. nucleus

C. α-particle

D. mesons

Answer: B

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147. The total number of electrons present in all s orbitals, all the p orbitals, and all the d orbitals of cesium ion are, respectively,

A. 8,26,10

B. 10, 24, 20

C. 8, 22, 24

D. 12, 20, 22

Answer: B

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148. The atomic number of an element is 35. What is the total number of electrons present in all the p-orbitals of the ground state atom of that element?

A. 6

B. 11

C. 17

D. 23

Answer: C

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149. Unpaired electrons in Ni^{++}, (Z = 28) is

A. 0

B. 2

C. 4

D. 8

Answer: B

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150. Two electrons occupying the same orbital are distinguished by :

A. principal quantum number

B. azimuthal quantum number

C. magnetic quantum number

D. orbital quantum number

Answer: D

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151. The emission spectrum of hydrogen is found to satisfy the expression for the energy change ΔE (in joules) such that

$$\Delta E = 2.18 \times 10^{-18}\left(\frac{1}{n_1^2} - \frac{1}{n_2^2}\right)J$$

where $n_1 = 1, 2, 3, ...$ and $n_2 = 2, 3, 4, ...$ The spectral lines correspond to Paschen series if

A. $n_1 = 1$ and $n_2 = 2, 3, 4$

B. $n_1 = 1$ and $n_2 = 3, 4, 5$

C. $n_1 = 2$ and $n_2 = 3, 4, 5$

D. $n_1 = 1$ and n_2 = infinity

Answer: B

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152. Nuclear theory of the atom was put forward by

A. Rutherford

B. Aston

C. Neils Bohr

D. J.J. Thomson

Answer: A

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153. For principal quantum number, n = 4, the toal number of orbitals having l = 3 is

A. 3

B. 7

C. 5

D. 9

Answer: B

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154. The correct enegry value order is

A. ns, np, nd, (n-1) f

B. ns, np, (n-1), (n-2)f

C. ns, np, (n-1)d, (n-1)f

D. ns,(n-1)d, np, (n-2)f

Answer: D

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155. Among the following series of transition metal ions the one where all meal 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. $Ti^{+}, V^{2+}, Cr^{3+}, Mn^{4+}$

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

Answer: A

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156. The frequency of radiations emitted when electron falls from $n=4$ to $n=1$ in $H-\text{atom}$ would be (Given E_1 for $H=2.18\times10^{-18}J\text{atom}^{-1}$ and $h=6.625\times10^{-34}Js$.)

A. $2.00\times10^{15}s^{-1}$

B. $1.54\times10^{15}s^{-1}$

C. $1.03\times10^{15}s^{-1}$

D. $3.08\times10^{15}s^{-1}$

Answer: D

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157. For d-electrons, the orbital angular momentum is

A. $\sqrt{6h/2\pi}$

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

C. $h/2\pi$

D. $2h/\pi$

Answer: A

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158. Which of the following electronic configuration is not possible according to Hund's rule?

A. $1s^2 2s^2$

B. $1s^2 2s^1$

C. $1s^2 2s^2 2p_x^1 2p_y^1 2p_z^1$

D. $s^2 2s^2 2p_x^2$

Answer: D

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159. Time taken by an electrons to complete one revolution in the Bohr orbit of the H atom is

A. $\dfrac{4\pi^2 mr^2}{nh}$

B. $\dfrac{nh}{4\pi^2 mr}$

C. $\dfrac{2\pi mr}{\pi^2 h^2}$

D. $\dfrac{h}{2\pi mr}$

Answer: A

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160. The atomic number of an element is derived from

A. Number of electrons

B. Number of protons

C. Number of neutrons

D. Number of nucleons

Answer: B

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161. One electron species having ionization enegry of $54.4eV$ is

A. H

B. He^{+}

C. B^{4+}

D. Li^{2+}

Answer: B

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162. The correct set of quantum numbers (n, l and m) respectively of the unpaired electron of chloine atom is

A. 2,1,0

B. 2,1,1

C. 3,1,1

D. 3,2,1

Answer: C

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163. Which of the following sets of quantum numbers is correct for an electron in 4f-orbtial ?

A. $n = 4, l = 3, m = +4, s = +1/2$

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

C. $n = 4, l = 3, m = +1, s = +1/2$

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

Answer: C

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164. Consider the ground state Cr atom $(Z = 24)$. The number of electron with the azimuthal number $l = 1$ and 2 ,respectively are

A. 12 and 4

B. 16 and 5

C. 16 and 4

D. 12 and 5

Answer: D

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165. The wavelength of the radiation emitted , when in a hydrogen atom electron falls from infinity to stationary state 1 , would be :

(Rydberg constant = $1.097 \times 10^7 m^{-1}$)

A. 91 nm

B. $9.1 \times 10^{-8} nm$

C. 406 nm

D. 192 nm

Answer: A

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166. Effective magentic moment of Sc^{3+} ion is

A. 1.73

B. 0

C. 5.92

D. 2.83

Answer: B

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167. The relationship between energy E, of the radiation with a wavelength 8000 Å and the energy of the radiation with a wavelength 16000 Å is

A. $E_1 = 6E_2$

B. $E_1 = 2E_2$

C. $E_1 = 4E_2$

D. $E_{10 = 1/2E_2}$

Answer: B

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168. The energy of second Bohr orbit of the hydrogen atom is $-328kJmol^{-1}$, hence the energy of fourth Bohr orbit would be.

A. $-41kJmol^{-1}$

B. $-1312kJmol^{-1}$

C. $-164 kJmol^{-1}$

D. $-82 kJmol^{-1}$

Answer: D

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169. in a multi- electron atom ,which of the following orbitals described by the three quantum numbers, which of the following will have nearly same energy?

$$\begin{array}{llll} (P) & n=1, l=0, m=0 & (q) & n=2, l=0, m=0 \\ (r) & n=2, l=1, m=1, & (S) & n=3, l=2, m=1 \\ (t) & n=3, l=2, m=0 & ,, & \end{array}$$

A. a and b

B. b and c

C. c and d

D. d and e

Answer: D

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170. Which of the following statement is correct in relation to the hydrogen atom :

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

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

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

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

Answer: D

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171. What is the packet of enegry called ?

A. electrons

B. photon

C. positron

D. proton

Answer: B

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172. The atomic numbers of elements X, Y,and Z are $19, 21,$ and $23,$ respectively. The number of eletron present in the M shells of these elements follows the order

A. $Z > X > Y$

B. $X > Y > Z$

C. $X > Y > Z$

D. $Z > Y > X$

Answer: C

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173. An electron is moving in Bohr's fourth orbit. Its de Broglie wavelength is λ. What is the circumference of the fourth orbit?

A. $2/\lambda$

B. 2λ

C. 4λ

D. $3/\lambda$

Answer: C

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174. The correct order of the number of unpaired electrons in the ions Cu^{2+}, Ni^{2+}, Fe^{3+}, and Cr^{3+} is

A. $Cu^{2+} > Ni^{2+} > Cr^{3+} > Fe^{3+}$

B. $Cr^{3+} > Fe^{2+} > Ni^{2+} > Ce^{2+}$

C. $Fe^{3+} > Cr^{3+} > Cu^{2+} > Ni^{2+}$

D. $Fe^{3+} > Cr^{3+} > Ni^{2+} > Cu^{2+}$

Answer: D

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

A. 3.0 BM

B. 4.9 BM

C. 5.9 BM

D. 6.9 BM

Answer: C

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176. The most probable radius (in pm) for finding the electron in He^{+} is.

A. 0

B. 52.9

C. 26.5

D. 105.8

Answer: C

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177. When potassium metal is exposed to violet light

A. Ejection of electrons takes place

B. Ejection of some potassium atoms occurs

C. There is no effect

D. The absorption of electrons takes place

Answer: A

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178. The H-spectrum confirms

A. Heisenberg's uncertainity principle

B. Differaction

C. Polarization

D. Presence of quantized energy levels.

Answer: D

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179. Electrons will first enterinto the orbital with the set of quantum numbers

A. $n = 5, l = 0$

B. $n = 4, l = 1$

C. $n = 3, l = 2$

D. any of these

Answer: C

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180. A metal surface is exposed to solar radiations. Which of the following is true?

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

B. The emitted electrons have energy less than the maximum value of energy depending

C. The intensity of incident radiation

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

Answer: A

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181. In which of the following transition will the wavelength be minimum ?

A. $n_4 \rightarrow n_1$

B. $n_2 \rightarrow n_1$

C. $n_4 \rightarrow n_2$

D. $n_3 \rightarrow n_1$

Answer: A

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182. Which of the following set of quantum numbers is not possible for an electron in the ground state of an atom with atomic number 19?

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

B. n = 2, l = 1, m = 0

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

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

Answer: D

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183. The angular momentum of an electron revolving in a p-orbital is

A. zero

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

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

D. $\dfrac{1}{2}.\dfrac{h}{2\pi}$

Answer: B

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184. The angular momentum of an electron is zero. In which orbital may it be present?

A. 2s

B. 2p

C. 3d

D. 4f

Answer: A

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185. Determine de-Broglie wavelength of an electron having kinetic energy of 1.6×10^{-6} erg.

$(m_c = 9.\ 11 \times 10^{-28} g, h = 6.62 \times 10^{-27} erg - \text{sec})$.

A. 662

B. 1324

C. 66.2

D. 6.62

Answer: A

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186. For a Bohr atom, angular momentum of an electron is

(n = 0, 1,2 .....)

A. $\frac{n^2 h^2}{4\pi}$

B. $\frac{nh^2}{4\pi}$

C. $\frac{\sqrt{nh}}{2\pi}$

D. $\frac{nh}{2\pi}$

Answer: D

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187. The radus of hydrogen atom in the ground state 0.53Å. The radius of Li^{2+} ion (Atomic number = 3) in a similar state is

A. 0.176Å

B. 0.53Å

C. 0.30Å

D. 1.25Å

Answer: A

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188. The atomic numbers of Ni and Cu are 28 and 29 respectively. The electronic configuration $1s^2 2s^2 2p^6 3s^2 3p^6 3d^{10}$ represent

A. Cu^{+}

B. Cu^{2+}

C. Ni^{2+}

D. Ni

Answer: A

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189. Which of the folowing statements is incorrect about an atomic orbital?

A. is a single electron wave function

B. describes trajectary of electron in an atom

C. defines distribution of electron density in space

D. can be represented by boundary surface.

Answer: B

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190. The maximum number of impaired electrons are in

A. Fe^{2+}

B. Fe^{3+}

C. Fe^{4+}

D. Fe

Answer: B

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191. A body of mass $10mg$ is moving with a velocity of $100ms^{-1}$. The wavelength of the de Broglie wave associated with it would be

A. $6.63 \times 10^{-7} m$

B. $6.63 \times 10^{-31} m$

C. $6.63 \times 10^{-4} m$

D. $6.63 \times 10^{-35} m$

Answer: B

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192. What is the wave number of 4th line in Balmer series of hydrogen spectrum ?

$R = 1, 109, 677 cm^{-1}$

A. $26630 cm^{-1}$

B. $24360 cm^{-1}$

C. $24730cm^{-1}$

D. $24372cm^{-1}$

Answer: D

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193. If 0.50 mol of $BaCl_2$ is mixed with 0.20 mol of Na_3PO_4, the maximum number of moles of $Ba_3(PO_4)_2$ that can be formed is

A. 0.7

B. 0.5

C. 0.3

D. 0.1

Answer: D

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194. What is the maximum number of electron in an atom that can have the quantum numbers $n = 4, m_l = +1$?

A. 4

B. 5

C. 3

D. 6

Answer: D

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195. The radius of the forst Bohr orbit of hydrogen atom is 0.59Å. The radius of the third orbit of He^{+} will be

A. 8.46Å

B. 0.705Å

C. 1.59Å

D. 2.38Å

Answer: D

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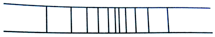
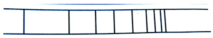
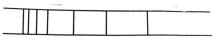
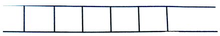
196. Which diagram best represnts the apperance of the line spectrum of atomic hydorgen in the visible region?

$\xrightarrow{Increa\sin g\lambda}$

A. (A) 

B. (B) 

C. (C) 

D. (D) 

Answer: C

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197. The wavelength of spectral line in Lyman series for electron jumping back from 2nd orbit is

A. 1162Å

B. 1216Å

C. 1362Å

D. 1176Å

Answer: B

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198. When the azimuthal quantum number has the value 2, the number of orbitals possible is

A. 3

B. 0

C. 7

D. 5

Answer: D

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199. The electronic conguration $1s^2 2s^2 2p^6 3s^2 3d^9$ represnts a

A. Metal atom

B. Non-metal atom

C. Non-metallic anion

D. Metallic cation

Answer: D

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200. $[Ar]^{18}3d^{10}4s^{1}$ electronic configuration belongs to

A. Ti

B. Tl

C. Cu

D. V

Answer: C

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201. The wavelength (in Å) of an emission line obtained for Li^{2+} during an electronic transition $n_2 = 2$ and n = 1 is (R = Rydberg constant)

A. $3R/4$

B. $27R/4$

C. $4/3R$

D. $4/27R$

Answer: D

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202. Match the following:

List I		List II	
(a)	$mvr = \frac{nh}{2\pi}$	(i)	Paschen series
(b)	Infrared	(ii)	Electron total energy
(c)	$\lambda = \frac{h}{p}$	(iii)	de-Broglie equation
(d)	$\frac{-KZe^2}{2r}$	(iv)	Shrodinger wave equation
		(v)	Bohr's equation

The correct answer is

A. $\begin{matrix}(a) & (b) & (c) & (d)\\ (v) & (ii) & (iii) & (i)\end{matrix}$

B. $\begin{matrix}(a) & (b) & (c) & (d)\\ (iii) & (ii) & (v) & (iv)\end{matrix}$

C. $\begin{matrix}(a) & (b) & (c) & (d)\\ (v) & (i) & (iii) & (ii)\end{matrix}$

D. $\begin{matrix}(a) & (b) & (c) & (d)\\ (iv) & (i) & (ii) & (iii)\end{matrix}$

Answer: C

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203. What is the wavelength (in m) of a particle of mass $6.62 \times 10^{-29} g$ moving with a velocity of $10^{3} ms^{-1}$?

A. 6.62×10^{-4}

B. 6.12×10^{-3}

C. 10^{-5}

D. 10^{5}

Answer: C

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204. What are the values of n_1 and n_2 respectively for H_B line in the Lyman series of hydrogen atom spectrum?

A. 3 and 5

B. 2 and 3

C. 1 and 3

D. 2 and 4

Answer: C

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205. Total number of radius in the 5th energy level is

A. 5

B. 10

C. 18

D. 25

Answer: D

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206. The atomic number of an element M is 26. How many electrons are present in the M-shell of the element in its M^{3+} state

A. 11

B. 15

C. 14

D. 13

Answer: D

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207. The incorrect statement is

A. circumference of electron orbit $(2\pi r) = n\lambda$ (n = an integer)

B. de-Broglie equation : $\lambda = \frac{h}{mv}$

C. angular momentum of an electron $\left(\frac{h}{mv} = \frac{2\pi r}{n} \text{ or } mvr = n\frac{h}{2\pi}\right)$ is an integral multiple of $\frac{h}{2\pi}$.

D. angular momentum of the electron in not quantized.

Answer: D

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208. Which of the following is not possible for 4p or 3d electrons?

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

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

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

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

Answer: C

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209. Which of the following represents the molarity of pure water?

A. 55.5

B. 56.5

C. 50.5

D. 57.55

Answer: A

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210. For the Paschen series thr values of n_1 and n_2 in the expression $\Delta E = R_{H}c\left[\frac{1}{n_1^2} - \frac{1}{n_2^2}\right]$ are

A. $n_1 = 1, n_2 = 2, 3, 4$

B. $n_1 = 2, n_2 = 3, 4, 5$

C. $n_1 = 3, n_2 = 4, 5, 6$

D. $n_1 = 4, n_2 = 5, 6, 7$

Answer: C

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211. What is the atomic number of the element with M^{2+} ion having electronic configuration $[Ar]3d^8$?

A. 28

B. 26

C. 25

D. 27

Answer: A

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212. The correct set of four quantum numbers for outermost electrons of potassium (Z = 19) is

A. $4, 1, 0, \frac{1}{2}$

B. $3, 1, 0, \frac{1}{2}$

C. $4, 0, 0, \frac{1}{2}$

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

Answer: C

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213. A body of mass x kg is moving with a velocity of $100ms^{-1}$. Its de-Broglie wavelength is $6.62 \times 10^{-35}m$. Hence x is $(h = 6.02 \times 10^{-34}Js)$

A. $0.1kg$

B. $0.25kg$

C. $0.15kg$

D. $0.2kg$

Answer: A

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214. Number of unpaired electrons in Fe^{3+} (Z = 26) is

A. 0

B. 2

C. 3

D. 5

Answer: D

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215. The correct set of quantum number for the unpaired electron of a chlorine atom is

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

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

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

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

Answer: C

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216. Common salt obtained from sea water contains $95\ \%\ NaCl$ by mass. The appoximate number of molecules present in $10.0g$ of the salt is

A. 10^{21}

B. 10^{22}

C. 10^{23}

D. 10^{24}

Answer: C

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

A. Increases

B. Decreases

C. Ramains constant

D. Decreases for lower value of n and increases for higher value of n.

Answer: B

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218. Wavelength of electron waves in two Bohr orbits is in ratio3:5 the ratio of kinetic energy of electron is 25 : x, hence x is :

A. $25 : 9$

B. $5 : 3$

C. $9 : 25$

D. $3:5$

Answer: A

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219. The energy of an electron in the 3rd orbit of an atom is $-E$. The energy of an electron in the first orbit will be

A. $-3E$

B. $-E/3$

C. $-E/9$

D. $-9E$

Answer: D

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220. The e/m ratio for electron was determined by ....

A. J.J. Thomson

B. Dalton

C. Chadwick

D. Goldstein

Answer: A

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221. Which orbital give an electron the greatest probability of being found close to the nucleus

A. 3p

B. 3d

C. 3s

D. equal

Answer: C

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222. If the de Broglie wave length of the fourth Bohr's orbit of hydrogen atom is 4 Å, the circumference of the orbit is:

A. 4Å

B. 4nm

C. 16Å

D. 16 nm

Answer: C

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223. From the given sets of quantum numbers, the one that is inconsistent with the theory is:

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

B. $n = 4, l = 3, m = 3, s = +\frac{1}{2}$

C. $n = 2, l = 1, m = 0, s = -\frac{1}{2}$

D. $n = 4, l = 3, m = 2, s = +\frac{1}{2}$

Answer: A

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224. A particle having a mass of 10 milligram has a velocity of 3600 km/hour. Calculate the wavelength of the particle $\left(h = 6.626 \times 10^{-27} \text{erg second}\right)$

A. $6.626 \times 10^{-30} cm$

B. $6.626 \times 10^{-31} cm$

C. $6.626 \times 10^{-28} cm$

D. $6.626 \times 10^{-29} cm$

Answer: A

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225. For the principal quantum number n = 2, the possible values of azimuthal quantum number and magnetic quantum number respectively are

A. 0, 1 , 2 and 1, 2,3

B. 0, 1, 2 and -1, 0, +1

C. 0, 1 and -1, 0, +1

D. 1, 2, 3 and -1, 0, +1

Answer: C

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226. Which is the correct order of wave number of the following radiations: infrared, ultraviolet, X-rays and visible light?

A. X-rays $>$ ultraviolet $>$ visible light $>$ infrared

B. Ultraviolet $>$ X-rays $>$ visiblelight $>$ infrared

C. X-rays $>$ ultraviolet $>$ infrared $>$ visible light

D. Visible light $>$ Ultraviolet $>$ X-rays $>$ infrared.

Answer: A

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227. What is the maximum number of emission lines when the excited electron of a H atom in $n = 6$ drop to the ground state?

A. 10

B. 5

C. 12

D. 15

Answer: A

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228. The dual nature of radiation was proposed by ....

A. Neils Bohr

B. Erwin Schrodinger

C. Louis de Broglie

D. Max Planck

Answer: C

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229. Out of the following which is the correct set of quantum number for outermost electron of potassium (Z = 19) ?

A. $\begin{matrix} n & l & m & s \\ 4 & 3 & 2 & -1/2 \end{matrix}$

B. $\begin{matrix} n & l & m & s \\ 4 & 2 & 0 & -1/2 \end{matrix}$

C. $\begin{matrix} n & l & m & s \\ 4 & 1 & 0 & +1/2 \end{matrix}$

D. $\begin{matrix} n & l & m & s \\ 4 & 0 & 0 & -1/2 \end{matrix}$

Answer: D

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230. In photoelectric effect, the kinetic energy of photoelectrons increases linearly with the

A. wavelength of incident light

B. frequency of incident light

C. velocity of incident light

D. atomic mass of an element

Answer: B

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231. Which of the following orbitals will have zero probability of finding the electron in the pz plane

A. px

B. py

C. pz

D. dyz

Answer: A

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232. If a species has 16 protons and 16 neutros, find the species and its charge

A. S^{1-}

B. Si^{2-}

C. p^{3-}

D. S^{2-}

Answer: D

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233. The wave number of the spectral line in the emission spectrum of hydrogen will be equal to $\frac{8}{9}$ times the

Rydberg's constant if the electron jumps from ....:-

A. n = 3 to n = 1

B. n = 10 to n = 1

C. n = 9 to n = 1

D. n = 2 to n = 1

Answer: A

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234. The shortest wavelength in hydrogen spectrum of Lyman series when $R_H = 109678 cm^{-1}$ is :-

A. 1002.7Å

B. 1215.67Å

C. 1127.30Å

D. 911.7Å

Answer: D

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235. A 600 W mercury lamp emits monochromatic radiation of wave length 313.3 nm. How many photons are emitted from the lamp per second ? ($h = 6.626 \times 10^{-34} Js$, velocity of light $= 3 \times 10^{8} ms^{-1}$)

A. 1×10^{19}

B. 1×10^{20}

C. 1×10^{21}

D. 1×10^{23}

Answer: C

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236. The set of quantum numbers of the outermost electron for copper in its ground state is.............

A. $4, 1, 1, +\frac{1}{2}$

B. $3, 2, 2, +1/2$

C. $4, 0, 0, +\frac{1}{2}$

D. $4, 2, 2, +1/2$

Answer: C

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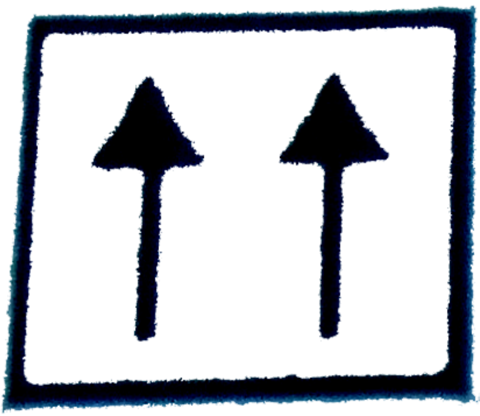
237. The representation of the ground state electronic configuration of He by box diagram as



is wrong because it violates

A. Heisenberg's uncertainity principle

B. Bohr's quantization theory of Angular Momentum

C. Pauli's exclusion principle

D. Hund's rule

Answer: C

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238. The electronic transition from n = 2 to n = 1 will produce shortest wave length in (where n = principle quantum state)

A. Li^{2+}

B. He^{+}

C. H

D. H^{+}

Answer: A

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239. In which one of the following pairs, the two species are both isoelectronic and isotopic ? (At. Numbers : Ca = 20, Ar = 18, K = 19, Mg = 12, Fe = 26, Na = 11)

A. $.^{40}Ca^{2-}$ and $.^{40}Ar$

B. $.^{39}K^{+}$ and $.^{40}K^{+}$

C. $.^{24}Mg^{2+}$ and $.^{25}Mg$

D. $.^{23}Na$ and $.^{24}Na^{+}$

Answer: B

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240. The energies E_1 and E_2 of two radiations are $25eV$ and $50eV$ respectively. The relation between their wavelengths, i.e., λ_1 and λ_2 will be.

A. $\lambda_1 = \frac{1}{2}\lambda_2$

B. $\lambda_1 = \lambda_2$

C. $\lambda_1 = 2\lambda_2$

D. $\lambda_1 = 4\lambda_2$

Answer: C

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241. The frequency of light emitted for the transition $n = 4$ to $n = 2$ of He^{+} is equal to the transition in H atom corresponding to which of the following ?

A. n = 3 to n = 1

B. n = 2 to n = 1

C. n = 3 to n = 2

D. n = 4 to n = 3

Answer: B

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242. For balmer series in the spectrum of atomic hydrogen the wave number of each line is given by $\overline{V} = R\left[\frac{1}{n_1^2} - \frac{1}{n_2^2}\right]$ where R_H is a constant and n_1 and n_2 are integers. Which of the following statements (s), is (are correct)

1. As wave length decreases the lines in the series converge

2. The integer n_1 is equal to 2.

3. The ionisation energy of hydrogen can be calculated from the wave numbers of three lines.

4. The line of shortest wavelength corresponds to = 3.

A. 1, 2 and 3

B. 2, 3 and 4

C. 1, 2 and 4

D. 2 and 4 only

Answer: C

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243. According to Bohr theory, which of the following transition in hydrogen atom will give rise to the least energetic proton?

A. $n = 6$ to $n = 1$

B. $n = 5$ to $n = 4$

C. $n = 6$ to $n = 5$

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

Answer: C

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

A. $(iv) < (ii) < (iii) < (i)$

B. $(ii) < (iv) < (i) < (iii)$

C. $(i) < (iii) < (ii) < (iv)$

D. $(iii) < (i) < (iv) < (ii)$

Answer: A

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245. Imposible orbital among the following is

A. 2s

B. 3f

C. 2p

D. 4d

Answer: B

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246. The mathematical expression for the uncertainty principle is

A. $\Delta x \Delta p \geq h / 4\pi$

B. $\Delta x \Delta v \geq h / (4\pi m)$

C. $\Delta E. \Delta T \geq h / 4\pi$

D. $\Delta E. \Delta x \geq h / 4\pi$

Answer: D

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247. The ionisation energy of H atom is $13.6eV$ The inoisation energy of Li^{2+} law will be

A. $27.2eV$

B. $40.8eV$

C. $54.4eV$

D. $108.8eV$

Answer: C

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248. Maximum number of electrons in a sub-shell with $l = 3$ and $n = 4$ is.

A. 14

B. 16

C. 10

D. 12

Answer: A

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249. Correct set of four quantum numbers for the valence (outermost) electron of rubidium $(Z = 37)$ is

A. $5, 1, 1, +\frac{1}{2}$

B. $6, 0, 0, +\frac{1}{2}$

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

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

Answer: C

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250. The kinetic energy of the electron in the second Bohr's orbit of a hydrogen atom [a_0 is Bohr's radius] is

A. $\dfrac{h^2}{4\pi^2 m a_0^2}$

B. $\dfrac{h^2}{16\pi^2 m a_0^2}$

C. $\dfrac{h^2}{32\pi^2 m a_0^2}$

D. $\dfrac{h^2}{64\pi^2 m a_0^2}$

Answer: C

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251. The angular momentum of an electron revolving in a p-orbital is

A. $\frac{h^2}{\sqrt{2}\pi}$

B. $\sqrt{3}\frac{h}{2\pi}$

C. $\sqrt{\frac{3}{2}\frac{h}{\pi}}$

D. $\sqrt{6}\frac{h}{2\pi}$

Answer: A

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252. which set of quantum number is not possible ?

A. $\begin{matrix} n & l & m & n \\ 3 & 2 & 0 & +1/2 \end{matrix}$

B. $\begin{matrix} n & l & m & n \\ 2 & 2 & 1 & +1/2 \end{matrix}$

C. $\begin{matrix} n & l & m & n \\ 1 & 0 & 0 & -1/2 \end{matrix}$

D. $\begin{matrix} n & l & m & n \\ 3 & 2 & 2 & +1/2 \end{matrix}$

Answer: B

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253. The ratio of the frequency corresponding to the third line in the lyman series of hydrogen atomic spectrum to that of the first line in Balmer series of Li^{2+} spectrum is

A. $4/5$

B. $5/4$

C. $4/3$

D. $3/4$

Answer: D

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254. The correct set of four quantum numbers for the outermost electron of sodium (Z = 11) is

A. $3, 1, 0, \frac{1}{2}$

B. $3, 1, 1, \frac{1}{2}$

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

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

Answer: D

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255. The value of Planck's constant is $6.63 \times 10^{-34} Js$. The speed of light is $3 \times 10^{17} nms^{-1}$. Which value is closest to the wavelength of quantum of light with frequency of $6 \times 10^{15} \sec^{-1}$?

A. 10

B. 25

C. 50

D. 75

Answer: C

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256. Based on equation $E = -2.178 \times 10^{-18} J\left(\frac{Z^2}{n^2}\right)$, certain conclusions are written. Which of them is not correct ?

A. The negative sign in equation simply means that the energy of electron bound to the nucleus is lower that in would be if the electron were in infinite distance from the nucleus

B. Lower the value of n, larger is the orbit radius

C. Equation can be used to calculate the change in energy when the electron chages orbit

D. For n = 1, the electron has a more negative energy that it does for = 6 which means that the electrons is more loosely bound in the smallest allowed orbit.

Answer: D

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257. Energy of an electron is givem by $E = -2.178 \times 10^{-18} J\left(\frac{Z^2}{n^2}\right)$. Wavelength of light required to excited an electron in an hydrogen atom from level $n = 1$ to $n = 2$ will be

$(h = 6.62 \times 10^{-34} Js$ and $c = 3.0 \times 10^8 ms^{-1})$.

A. $8.500 \times 10^{-7} m$

B. $1.214 \times 10^{-7} m$

C. $2.816 \times 10^{-7} m$

D. $6.500 \times 10^{-7} m$

Answer: B

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258. What is the maximum number of electrons that can be associated with a following set of quantum numbers ? $(n = 3, l = 1 \text{ and } m = -1)$.

A. 10

B. 6

C. 4

D. 2

Answer: D

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Selected Straight Objective Type MCQs

1. Which of the following statements are correct for an electron that has n = 4 and m = -2 ? (i)The electron may be in a p-orbital. (ii)The electron is in the forth principle electronic shell. (iii)The electron may be in a d-orbital. (iv)The electron must have the spin quantum number = -1/2

A. (i) and (ii)

B. (i) and (iii)

C. (ii) and (iii)

D. (iii) and (iv)

Answer: C

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2. Rutherford's α particle scattering experiment eventually led to the conclusion that

A. nucleus is very small in size

B. nucleus is rigid part

C. most of the space in the atom is emptys

D. nucleus contains neutrons

Answer: A::B::C

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3. The wave character of moving electron was experimentally verified by :

A. de Broglie

B. Davision and Germer

C. G.P. Thomson

D. Rutherford

Answer: B::C

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4. Which of the following statement (s) is (are) wrong ?

A. If the value of l = 0, the electron distribution is spherical

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

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

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

Answer: B::C

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5. Consider the electronic configuration for atoms (X) $1s^2 2s^2 2p^6 3s^1 \quad (Y) 1s^2 2s^2 2p^6 4s^1$

Which of the following statement (s) us (are) NOT true?

A. Energy is required to change (X) to (Y)

B. (X) represents Na atom

C. (X) and (Y) represents different elements

D. More energy is required to remove one electron from (Y) than from (X).

Answer: C::D

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6. Which of the following statement (s) is (are) not correct?

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

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

C. The energy of an electron in an atomic orbital of multielectron atom depends on principal quantum number

D. The number of degenerate atomic orbitals of one type depends on the values of principal, azimuthal and magnetic quantum numbers.

Answer: C::D

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7. For the energy levels in atom, which one of the following statement (s) is (are) correct?

A. For Ca (Z = 20) energy of the 4s-subshell is less than 3d-subshell

B. For Zn (Z = 30) energy of 3d-subshell is less than 4s-subshell

C. For Ca (Z = 20) energy of the 4s-subshell is more than 3d-subshell

D. For Zn (Z = 30) energy of 3d-subshell is more than 4s-subshell

Answer: A::B

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8. Some of the following sets of quantum numbers are incorrect for d 4d electron. Which are the incorrect sets?

A. $4, 3, 2, +\frac{1}{2}$

B. 4,2,1,0

C. $4, 2, -2, +\frac{1}{2}$

D. $4, 2, 1, -\frac{1}{2}$

Answer: B::C::D

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9. An isotone of $._{32}^{76}Ge$ is-

(a) $._{32}^{77}Ge$

(b).$_{33}^{77}As$

(c).$_{34}^{77}Se$

(d).$_{34}^{78}Se$

A. $._{34}^{78}Se$

B. $._{33}^{77}As$

C. $._{34}^{77}Se$

D. $._{32}^{77}Ge$

Answer: A::B

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10. Many elements have non-integral atomic masses because

A. they have isotopes

B. their isotopes have non-integral masses

C. their isotopes have different masses

D. the constituents, neutrons, protons and electrons combine to give fractional masses.

Answer: A::C

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11. Which of the following statement (s) are (are) correct?

A. The electronic configuration of Cr is $[Ar]3d^5 4s^1$

(Atomic number of Cr = 24)

B. The magnetic quantum number may have a negative value

C. In silver atom, 23 electrons have a spin of one type and 24 of the opposite type (Atomic number of Ag = 47)

D. The oxidation state of nitrogen in NH_3 is -3

Answer: A::B::C

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12. The less ground state electronic configeration of nitrogen atom can be represented by

a. $\boxed{\uparrow\downarrow}$ $\boxed{\uparrow\downarrow}$ $\boxed{\uparrow \mid \uparrow \mid \uparrow}$

b. $\boxed{\uparrow\downarrow}$ $\boxed{\uparrow\downarrow}$ $\boxed{\uparrow \mid \downarrow \mid \uparrow}$

c. $\boxed{\uparrow\downarrow}$ $\boxed{\uparrow\downarrow}$ $\boxed{\uparrow \mid \downarrow \mid \downarrow}$

d. $\boxed{\uparrow\downarrow}$ $\boxed{\uparrow\downarrow}$ $\boxed{\downarrow \mid \downarrow \mid \downarrow}$

A. (A) $\boxed{\uparrow\downarrow}$ $\boxed{\uparrow\downarrow}$ $\boxed{\uparrow \mid \uparrow \mid \uparrow}$

B. (B) $\boxed{\uparrow\downarrow}$ $\boxed{\uparrow\downarrow}$ $\boxed{\uparrow \mid \downarrow \mid \uparrow}$

C. (C) $\boxed{\uparrow\downarrow}$ $\boxed{\uparrow\downarrow}$ $\boxed{\uparrow \mid \downarrow \mid \downarrow}$

D. (D) $\boxed{\uparrow\downarrow}$ $\boxed{\uparrow\downarrow}$ $\boxed{\downarrow \mid \downarrow \mid \downarrow}$

Answer: A::D

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

A. 0

B. 2

C. 4

D. 8

Answer: B

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14. 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: C

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15. The principal quantum number of an atom is related in the

A. size of the orbital

B. spin angular momentum

C. orbital angular momentum

D. orientation of the orbital in space

Answer: A

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16. Any p arbital can accommodate up to

A. four electrons

B. two electrons with parallel spin

C. six electrons

D. two electrons with opposite spin.

Answer: D

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17. The magnetic quantum number of an atom is releted to the

A. size of the orbital

B. spin angular momentum

C. orbital angular momentum

D. orientation of the orbital in space

Answer: D

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18. Rutherford's scattering experiment is related to the size of the

A. nucleus

B. atom

C. electron

D. neutron

Answer: A

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19. When alpha particle are sent through a thin metal foil ,most of them go straight through the foil because

A. α-particles are much heavier than electron

B. α-particles are positively charged

C. α-particles move with high velocity

D. most part of the atom is empty

Answer: D

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20. Which electronic level would allow the hydrogen atom to absorb a photon but not to emit a photon ?

A. 1s

B. 2s

C. 2p

D. 3d

Answer: A

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21. Bohr's model can explain

A. the spectrum of hydrogen atom only

B. spectrum of atom or ion containing one electron only

C. the spectrum of hydrogen molecule

D. the solar spectrum

Answer: B

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22. Electromagnetic radiation with maximum wavelengths is :

A. ultra-violet

B. radiowave

C. X-rays

D. infrared

Answer: B

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23. Rutherford's α particle scattering experiment eventually led to the conclusion that

A. mass and energy are related

B. electrons occupy empty space around the nucleus

C. neutrons are buried deep in the nucleus

D. the point of impact with matter can be precisely determined

Answer: B

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24. Which of the following sets of quantum numbers represents an impossible arrangement ?

A. $\begin{matrix} n & l & m_1 & m_s \\ 3 & 2 & -2 & 1/2 \end{matrix}$

B. $\begin{matrix} n & l & m_1 & m_s \\ 4 & 0 & 0 & 1/2 \end{matrix}$

C. $\begin{matrix} n & l & m_1 & m_s \\ 3 & 2 & -3 & 1/2 \end{matrix}$

D. $\begin{matrix} n & l & m_1 & m_s \\ 5 & 3 & 0 & -\frac{1}{2} \end{matrix}$

Answer: C

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25. The triad of nuclei that is isotonic is

A. $._6C^{14}, ._7C^{15}, ._9F^{17}$

B. $._{6}C^{12}, ._{7}C^{14}, ._{9}F^{19}$

C. $._{6}C^{14}, ._{7}N^{14}, ._{9}F^{17}$

D. $._{6}C^{14}, ._{7}N^{14}, ._{9}F^{19}$

Answer: A

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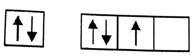
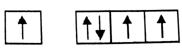
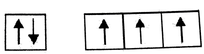
26. The orbital diagram in which the Aufbau principle is violated is

A. (A) 

B. (B) 

C. (C) 

D. (D) 

Answer: B

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27. The quantum number not obtained from the schrodinger's wave equation is

A. n

B. l

C. m

D. s

Answer: D

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28. The outer shell configuration of the most electronegative element is

A. ns^2np^3

B. ns^2np^4

C. ns^2np^5

D. ns^2np^6

Answer: C

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29. If the speed of electron in the first bohr orbit of hydrogen atom is x then the speed of the electron in the third Bohr orbit of hydrogen is

A. $x/9$

B. $x/3$

C. $3x$

D. $9x$

Answer: B

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30. If wavelength of photon is $2.2 \times 10^{-11} m$, $h = 6.6 \times 10^{-34} Js$, then momentum of photons is

A. $3 \times 10^{-23} kg/s$

B. $1.452 \times 10^{-44} kg / s$

C. $3.33 \times 10^{22} kg / s$

D. $6.89 \times 10^{43} kg / s$

Answer: A

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31. Which of the following does not characteristic X -rays ?

A. The radiation can ionise the gas

B. It causes this ZnS to fluoresence

C. Deflected by electrical and magnetic field

D. Have wavelength shorter than ultra violet rays.

Answer: C

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32. Which of the following relates to photons both as wave motion and as a stream of particles?

A. Interference

B. $E = mc^2$

C. Diffraction

D. $E = hv$

Answer: D

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33. Which combinations of quantum number n, l, m, s for the electron in an atom does not provide a permissible solution of the wave equation ?

A. $3, 2, -2, 1/2$

B. $3, 3, 1, -1/2$

C. $3, 2, 1, 1/2$

D. $3, 1, 1, -1/2$

Answer: B

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34. The wave number of the first line of Balmer series of hydrogen is $15200cm^{-1}$ The wave number of the first Balmer line of Li^{2+} ion is

A. $15200cm^{-1}$

B. $60800cm^{-1}$

C. $76000cm^{-1}$

D. $136, 800cm^{-1}$

Answer: D

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35. Which of the following has non-spherical sub-shell of electron ?

A. He

B. B

C. Be

D. Li

Answer: B

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36. What transition in the hydrogen spectrum would have the same wavelength as the Balmer transition $n = 4$ to

$n = 2$ of He^+ spectrum ?

A. n = 4 to n = 1

B. n = 3 to n = 2

C. n = 3 to n = 1

D. n = 2 to n = 1

Answer: D

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37. Pick out the isoelectronic structures from the following

(i) CH_3^+ , (ii) H_3O^+

(iii) NH_3 , (iv) CH_3^-

A. (i) and (ii)

B. (iii) and (iv)

C. (i) and (iii)

D. (ii) (iii) and (iv)

Answer: D

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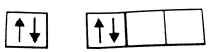
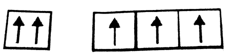
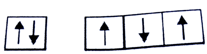
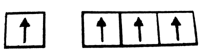
38. Which of the following is a violation of the Pauli exclusion principle?

A. (A) 

B. 

C. (C) 

D. (D) 

Answer: B

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39. From the given sets of quantum numbers, the one that is inconsistent with the theory is:

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

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

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

D. $n = 4, l = 3, m = 2, s = +1/2$

Answer: A

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40. The orbital angular momentum of an electron in $2s$-orbital is

A. $+\frac{1}{2}\frac{h}{2\pi}$

B. zero

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

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

Answer: B

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41. Which of the following has maximum number of unpaired electron ?

A. Mg^{2+}

B. Ti^{3+}

C. V^{3+}

D. Fe^{2+}

Answer: D

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42. An element M has an atomic mass 19 and atomic number 9. Its ion is represented by

A. M^{+}

B. M^{2+}

C. M^{-}

D. M^{2-}

Answer: C

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43. The energy of an electron in the first Bohr orbit of H atom is $-13.6eV$ The potential energy value (s) of excited state(s) for the electron in the Bohr orbit of hydrogen is(are)

A. $-3.4eV$

B. $-4.2eV$

C. $-6.8eV$

D. $+6.8eV$

Answer: A

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

A. $(iv) < (ii) < (iii) < (i)$

B. $(ii) < (iv) < (i) < (iii)$

C. $(i) < (iii) < (ii) < (iv)$

D. $(iii) < (i) < (iv) < (ii)$

Answer: A

45. The electronic configuration of an element is $1s^2 2s^2 2p^6 3s^2 3p^6 3d^5 4s^1$ .This represents its

A. excited state

B. ground state

C. cationic form

D. anionic form

Answer: B

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46. The number of nodal planes in a p_x orbital is :

A. one

B. two

C. three

D. zero.

Answer: A

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47. The wavelength associated with a gold weighing $200g$ and moving at a speed of $5m/h$ is of the order :-

(a). $10^{-10}m$

(b). $10^{-20}m$

(c).$10^{-30}m$

(d). $10^{-40}m$

A. $10^{-10}m$

B. $10^{-20}m$

C. $10^{-30}m$

D. $10^{-40}m$

Answer: C

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48. The quatum numbers $+\frac{1}{2}$ and $-\frac{1}{2}$ for the electron spin represent

A. rotation of electron in clockwise and anti clockwise directions respectively

B. rotation of electron in anticlockwise and clockwise direction respectively

C. magnetic moments of electrons pointing up and down respectively

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

Answer: D

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49. If nitrogen atoms had el,ectonic configuration is ? It would have energy lower than that of the nornal ground state configuration $1s^2 2s^2 2p^3$ because the electrons would be clear to the nucleus yet $1s^2$ is not oberved because it violates ?

A. Heisenberg's uncertainity principle

B. Hund's rule

C. Pauli's exclusion principle

D. Bohr postulates of stationary orbits

Answer: C

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50. Rutherford's scattering experiment, which established the nuclear model of the atom, used a beam of

A. β-particles, which impinged on a metal foil and got absorbed

B. γ-rays, which impinged on a metal foil and ejected electrons

C. helium atoms, which impinged on a metal foil and got scattered

D. helium nuclei, which impinged on a metal foil and got scattered

Answer: D

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51. Identify the least stable among the following

A. Li^{-}

B. Be^{-}

C. B^{-}

D. C^{-}

Answer: B

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52. How many structures of F is possible ?

A. 2

B. 5

C. 6

D. 3

Answer: C

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53. The radius of which of the following orbit is same as that of the first Bohr's orbit of hydrogen atom.

A. He^{+} (n=2)

B. Li^{2+} (n = 2)

C. Li^{2+} (n=3)

D. Be^{3+} (n=2)

Answer: D

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54. The number of radial nodes in $3s$ and $2p$, respectively, are

A. $0, 2$

B. $2, 1$

C. $2, 0$

D. $1, 2$

Answer: C

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55. A proton is about 1840 times heavier than an electron. When it is accelerated by a potential difference difference of $1kV$, its kinetic enegry will be

A. 1840 keV

B. 1/1840 keV

C. 1keV

D. 920 keV

Answer: C

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56. According to Boohr's theory the angular momentum of an electron in 5th orbit is :

A. $10h/\pi$

B. $2.5h/\pi$

C. $25h/\pi$

D. $1.0h/\pi$

Answer: B

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57. Uncertainty in the position of an electron mass $(9.1 \times 10^{31} kg)$ moving with a velocity $300ms^{-1}$ accurate uptp $0.001\,\%$ will be :

A. $1.92 \times 10^{-2} m$

B. $3.84 \times 10^{-2} m$

C. $19.2 \times 10^{-2} m$

D. $5.76 \times 10^{-34} m$

Answer: A

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58. The de Broglie wavelength associated with a ball of mass $1kg$ having kinetic enegry $0.5J$ is

A. $6.626 \times 10^{-34} m$

B. $13.20 \times 10^{-34} m$

C. $10.38 \times 10^{-29} m$

D. $6.626 \times 10^{-34} \text{Å}$

Answer: A

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59. Given $m_e = 9.11 \times 10^{-31} kg$ and $h = 6.626 \times 10^{-34} Js$, the uncertainty involved in the measuremenetof velocity within a distance of 0.1Å is

A. $5.79 \times 10^{8} ms^{-1}$

B. $5.79 \times 10^{5} ms^{-1}$

C. $5.79 \times 10^{6} ms^{-1}$

D. $5.79 \times 10^7 ms^{-1}$

Answer: C

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60. Which of the following sets of quantum numbers represents the highest energy of an atom?

A. $n = 3, l = 0, m = 0, s = +\frac{1}{2}$

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

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

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

Answer: C

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61. Consider the following sets of quantum numbers.

(i) $\begin{matrix} n & l & m & s \\ 3 & 0 & 0 & +1/2 \end{matrix}$

(ii) $\begin{matrix} n & l & m & s \\ 2 & 2 & 1 & +1/2 \end{matrix}$

(iii) $\begin{matrix} n & l & m & s \\ 4 & 3 & -2 & -1/2 \end{matrix}$

(iv) $\begin{matrix} n & l & m & s \\ 1 & 0 & -1 & -1/2 \end{matrix}$

(v) $\begin{matrix} n & l & m & s \\ 3 & 2 & 3 & +1/2 \end{matrix}$

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

A. (i) and (ii)

B. (ii), (iii) and (iv)

C. (i), (ii), (iii) and (iv)

D. (ii), (iv) and (v)

Answer: D

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62. If uncertainty in position and momentum are equal then uncertainty in velocity is.

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

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

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

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

Answer: A

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63. The measurement of the electron position is associated with an uncertainty in momentum, which is equal to $1 \times 10^{-18} gcms^{-1}$. The uncertainty in electron velocity is (mass of an electron is $9 \times 10^{-28} g$)

A. $1 \times 10^{9} cms^{-1}$

B. $1 \times 10^{6} cms^{-1}$

C. $1 \times 10^{5} cms^{-1}$

D. $1 \times 10^{11} ms^{-1}$

Answer: A

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64. The ionization enthalpy of hydrogen atom is $1.312 \times 10^6 Jmol^{-1}$. The energy required to excite the electron in the atom from $n = 1$ to $n = 2$ is :

A. $7.56 \times 10^5 Jmol^{-1}$

B. $9.84 \times 10^5 Jmol^{-1}$

C. $8.51 \times 10^5 Jmol^{-1}$

D. $6.56 \times 10^5 Jmol^{-1}$

Answer: B

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65. Maximum number of electrons in a sub-shell of an atom is determined by the following.

A. $2n^2$

B. $4l + 2$

C. $2l + 2$

D. $4l - 2$

Answer: B

Watch Video Solution

66. Which of the following is not permissible arrangement of electrons in an atom ?

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

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

C. $n = 5, l = 3, m = 0, s = +1/2$

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

Answer: D

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67. In an atom , an electron is moving with a speed of 600 m/s with an accuracy of 0.05% . The certainty with which the position of the electron can be located is (h = $6.6 \times 10^{-34} kgm^2 s^{-1}$, mass of electron , $e_m = 9.1 \times 10^{-31}$ kg):

A. $1.52 \times 10^{-4} m$

B. $5.10 \times 10^{-3} m$

C. $1.92 \times 10^{-3} m$

D. $3.84 \times 10^{-3} m$

Answer: C

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68. Given that the abundacne of isotopes $.^{54} Fe$, $.^{56} Fe$, and $.^{57} Fe$ is 5%, 90% and 5% respectively. The atomic mass of Fe is

A. 55.85

B. 55.95

C. 55.75

D. 56.05

Answer: B

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69. The energy required to break one mole of $Cl - Cl$ bonds in Cl_2 is $242 kJ mol^{-1}$. The longest wavelength of light capable of breaking a since $Cl - Cl$ bond is

A. 494 nm

B. 594 nm

C. 640 nm

D. 700 nm

Answer: A

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70. If $n = 6$, the correct sequence for filling of electrons will be.

A. $ns \rightarrow (n-2)f \rightarrow np \rightarrow (n-1)d$

B. $ns \rightarrow np \rightarrow (n-1)d \rightarrow (n-2)f$

C. $ns \rightarrow (n-2)f \rightarrow (n-1)d \rightarrow np$

D. $ns \rightarrow (n-1)d \rightarrow (n-2)f \rightarrow np$

Answer: C

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1. An electron in an atom can be completely designated with the help of four quantum numbers. Out of these, the first three i.e., principal (n), azimuthal (l) and magnetic (m) quantum number are obtained from the solution of Shrodinger wave equation while the spin(s) quantum number arises from the spin of the electron around its axis clockwise or antiaclockwise. Ot of these principal quantum number tells about the size, azimuthal quantum number about the shape and magnetic quantum signifies the orientation of the electron orbital.

The maximum number of electrons in a subshell having the same value of spin quantum number is given by

A. $l+2$

B. $2l + 1$

C. $l(l + 1)$

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

Answer: B

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2. An electron in an atom can be completely designated with the help of four quantum numbers. Out of these, the first three i.e., principal (n), azimuthal (l) and magnetic (m) quantum number are obtained from the solution of Shrodinger wave equation while the spin(s) quantum number arises from the spin of the electron around its axis clockwise or antiaclockwise. Ot of these principal quantum number tells about the size, azimuthal quantum number about the shape and magnetic quantum signifies the orientation of the electron orbital.

The electronic configuration of P in H_3PO_4 is

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

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

C. $1s^2 2s^2 2p^6$

D. $1s^2 2s^2 2p^6 3s^2 3p^6 4s^1$

Answer: C

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3. An electron in an atom can be completely designated with the help of four quantum numbers. Out of these, the first three i.e., principal (n), azimuthal (l) and magnetic (m) quantum number are obtained from the solution of Shrodinger wave equation while the spin(s) quantum number arises from the spin of the electron around its axis clockwise or antiaclockwise. Ot of these principal quantum number tells about the size, azimuthal quantum number about the shape and magnetic quantum signifies the orientation of the electron orbital.

How many electrons in a given atom have the following set of quantium numbers?

$n = 3, l = 2, m = \ + 2, s = \ - 1/2$

A. 1

B. 18

C. 14

D. cannot be known

Answer: A

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4. It is not possible to determine preciselt both the position and momentum (or velocity) of a small moving particle such as electron, proton etc. This is known as Heisenber uncertainty principle. The mathemactical form of this principle is :

$\Delta x. \Delta p \geq \frac{h}{4\pi}$ (constant)

However this principle is irrevalent in case of bigger particles such as a cup, ball, car etc., that we come across in our daily life.

In case of small microscopic particles, Heisenberg's uncertainty principle rules out simultaneous exact determination of their

A. energy and velocity

B. charge density and radius

C. postion and momentum

D. none of the above three

Answer: C

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5. It is not possible to determine preciselt both the position and momentum (or velocity) of a small moving particle such as electron, proton etc. This is known as Heisenber uncertainty principle. The mathemactical form of this principle is :

$\Delta x.\ \Delta p \geq \frac{h}{4\pi}$ (constant)

However this principle is irrevalent in case of bigger particles such as a cup, ball, car etc., that we come across in our daily life.

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

A. zero

B. greater than $h / 4\pi$

C. less than $h / 4\pi$

D. infinite.

Answer: D

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6. It is not possible to determine preciselt both the position and momentum (or velocity) of a small moving particle such as electron, proton etc. This is known as Heisenber uncertainty principle. The mathemactical form of this principle is :

$\Delta x . \Delta p \geq \frac{h}{4\pi}$ (constant)

However this principle is irrevalent in case of bigger particles such as a cup, ball, car etc., that we come across in our daily life.

If uncertainty in position and momentum are equal, the v uncertainty in velocity would be

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

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

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

D. None of these

Answer: A

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7. It is not possible to determine preciselt both the position and momentum (or velocity) of a small moving particle such as electron, proton etc. This is known as Heisenber uncertainty principle. The mathemactical form of this principle is :

$\Delta x . \Delta p \geq \frac{h}{4\pi}$ (constant)

However this principle is irrevalent in case of bigger particles such as a cup, ball, car etc., that we come across in our daily life.

Given that the mass of electron is $9.1 \times 10^{-31} kg$ and velocity of electron is $2.2 \times 10^{6} ms^{-1}$, if uncertainty in its velocity is 0.1% , the uncertainty in position would be

A. $26 nm$

B. $32 nm$

C. $48 nm$

D. $50 nm$

Answer: A

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8. An electron in the hydrogen atom absorbs energy and jumps to the 4th orbit. It jumps back to the ground state in steps e.g., from 4th to 3rd orbit, then from 3rd to 2nd orbit and finally to the ground state etc.

Total number of lines obtained in the spectrum would be

A. 3

B. 6

C. 9

D. 12

Answer: B

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9. An electron in the hydrogen atom absorbs energy and jumps to the 4th orbit. It jumps back to the ground state in steps e.g., from 4th to 3rd orbit, then from 3rd to 2nd orbit and finally to the ground state etc.

If λ_1 is the wave length of line for jump of the electron from 4th to 3rd orbit and λ_2 that of the line for jump from 3rd to 2nd orbit, then wavelength of the line for jump from 4th orbit to 2nd orbit would be

A. $\lambda_1 + \lambda_2$

B. $\dfrac{\lambda_1 \lambda_2}{\lambda_1 + \lambda_2}$

C. $\dfrac{\lambda_1 \lambda_2}{\lambda_1 - \lambda_2}$

D. $\dfrac{\lambda_1 + \lambda_2}{\lambda_1 + \lambda_2}$

Answer: B

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10. An electron in the hydrogen atom absorbs energy and jumps to the 4th orbit. It jumps back to the ground state in steps e.g., from 4th to 3rd orbit, then from 3rd to 2nd orbit and finally to the ground state etc.

If the ionization of the hydrogen atom in the ground state is $13.6eV$. The longest wavelength of the radiation required to remove the electron from Bohr's first orbit will be approximately

A. 612Å

B. 712Å

C. 812Å

D. 912Å

Answer: D

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11. An electron in the hydrogen atom absorbs energy and jumps to the 4th orbit. It jumps back to the ground state in steps e.g., from 4th to 3rd orbit, then from 3rd to 2nd orbit and finally to the ground state etc.

If a_0 represents Bohr radius, the de-Broglie wavelength of the electron when it moves in the 3rd orbit after absorbing same definite amount of energy will be

A. $a_0 / 3$

B. $9a_0$

C. $2\pi a_0$

D. $6\pi a_0$

Answer: D

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12. The enregy, radius and velocity of the electron in the hydrogen atom in the ground state are $-13.6eV, 0.53\text{Å}$ and $2.188 \times 10^8 ms^{-1}$ respectively.

The energy of the electron in the third orbit will be

A. $-4.4eV$

B. $-1.5eV$

C. $-40.8eV$

D. $-22.4eV$

Answer: B

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13. The enregy, radius and velocity of the electron in the hydrogen atom in the ground state are $-13.6eV$, 0.53Å and $2.188 \times 10^8 ms^{-1}$ respectively.

The radius of the third orbit of hydrogen atom will be

A. 1.59Å

B. 4.77Å

C. 3.0Å

D. 6.0Å

Answer: B

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14. The enregy, radius and velocity of the electron in the hydrogen atom in the ground state are $-13.6eV, 0.53\text{Å}$ and $2.188 \times 10^8 ms^{-1}$ respectively.

The velocity of the electron in the third orbit of hydrogen atom will be

A. $0.729 \times 10^8 cms^{-1}$

B. $6.564 \times 10^8 cms^{-1}$

C. $19.692 \times 10^8 cms^{-1}$

D. $0.243 \times 10^8 cms^{-1}$

Answer: A

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15. The enregy, radius and velocity of the electron in the hydrogen atom in the ground state are $-13.6eV$, 0.53Å and $2.188 \times 10^8 ms^{-1}$ respectively.

If the electron absorbs $12.1eV$ of energy, it will jump to the orbit

A. 2nd

B. 3rd

C. 4th

D. 5th

Answer: B

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16. The enregy, radius and velocity of the electron in the hydrogen atom in the ground state are $-13.6eV, 0.53\text{Å}$ and $2.188 \times 10^8 ms^{-1}$ respectively.

In which orbit of He^+ the electron will have same velocity

A. 1st

B. 2nd

C. 4th

D. none

Answer: D

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17. The enregy, radius and velocity of the electron in the hydrogen atom in the ground state are $-13.6eV, 0.53Å$ and $2.188 \times 10^8 ms^{-1}$ respectively.

Which shell of He^+ ion will have the same energy

A. 1st

B. 2nd

C. 3rd

D. 4th

Answer: B

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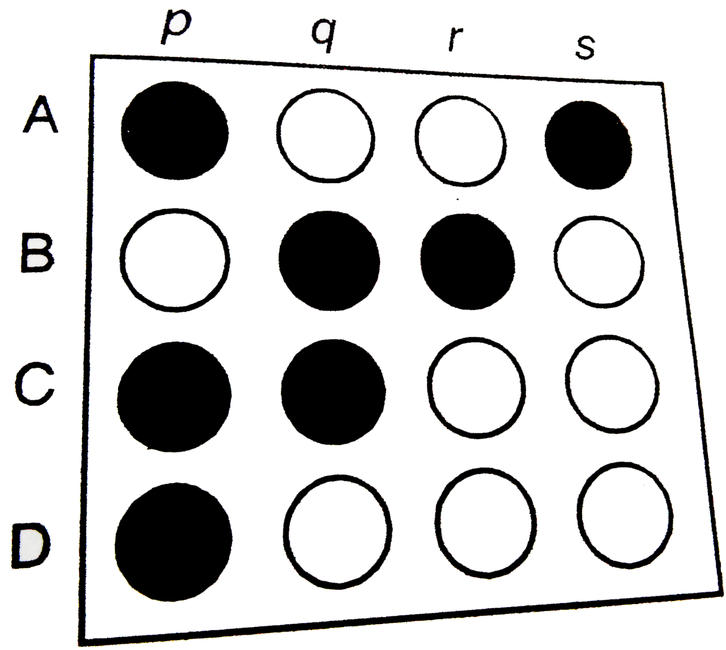
Matrix match type MCQs

1. Here each question contains statements given in two columns which have to the matched statements in column I are labelled as A,B, C and D where as statement in column II are labelled as p,q,r and s. the answer to these questions are to be bubbled 4 x 4 matrix. if the correct matched are A-p,A-s,B-q,C-p, and D-p then the correctly bubbled matrix should look like the following



Column I		Column II	
(A)	Lyman	(p)	Ultraviolet
(B)	Paschen	(q)	Near Infrared
(C)	Balmer	(r)	Far Infrared
(D)	Pfund	(s)	Visible.

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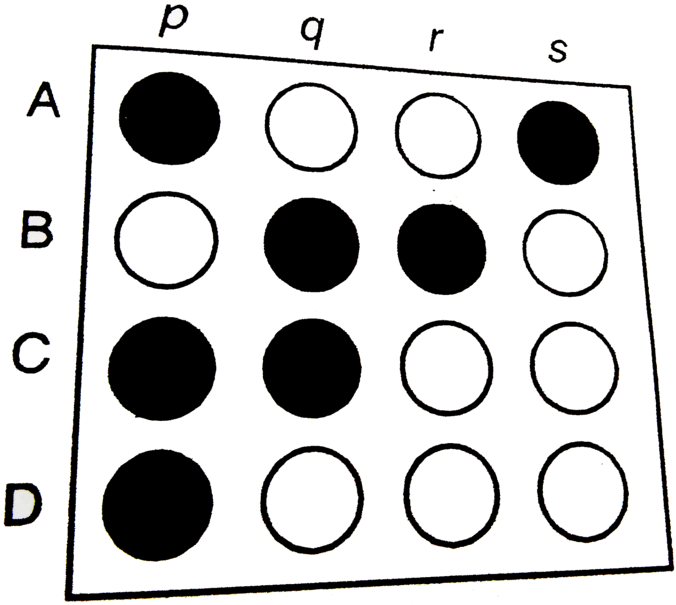
2. Here each question contains statements given in two columns which have to the matched statements in column I are labelled as A,B, C and D where as statement in column II are labelled as p,q,r and s. the answer to these questions are to be bubbled 4 x 4 matrix. if the correct matched are A-p,A-s,B-q,C-p, and D-p then the correctly bubbled matrix should look like the following



Column I (Principle)	Column II (Discoverer)
(A) Exclusion Principle	(*p*) Hund
(B) Multiplicity rule	(*q*) Heisenberg
(C) Uncertainty principle	(*r*) Pauli
(D) Quantum Theory	(*s*) Planck

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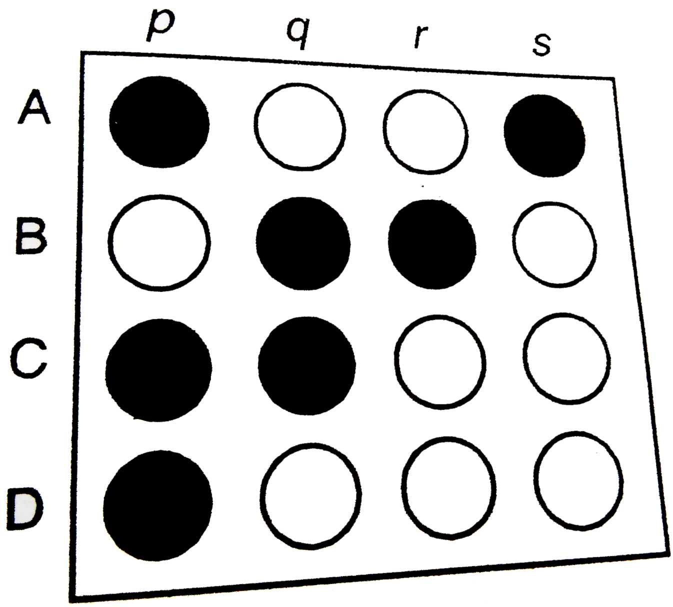
3. Here each question contains statements given in two columns which have to the matched statements in column I are labelled as A,B, C and D where as statement in column II are labelled as p,q,r and s. the answer to these questions are to be bubbled 4 x 4 matrix. if the correct matched are A-p,A-s,B-q,C-p, and D-p then the correctly bubbled matrix should look like the following



Column I	Column II
(A) $\Delta x \times \Delta p = \dfrac{h}{4\pi}$	(p) Ritz combination principle
(B) $mvr = \dfrac{nh}{2\pi}$	(q) Bohr's radius of hydrogen atom
(C) $r' = \dfrac{n^2}{4\pi^2 me^2}$	(r) Angular momentum is quantized
(D) $\bar{v} = R_H \left[\dfrac{1}{n_1^2} - \dfrac{1}{n_2^2}\right]$	(s) Heisenberg uncertainty rule

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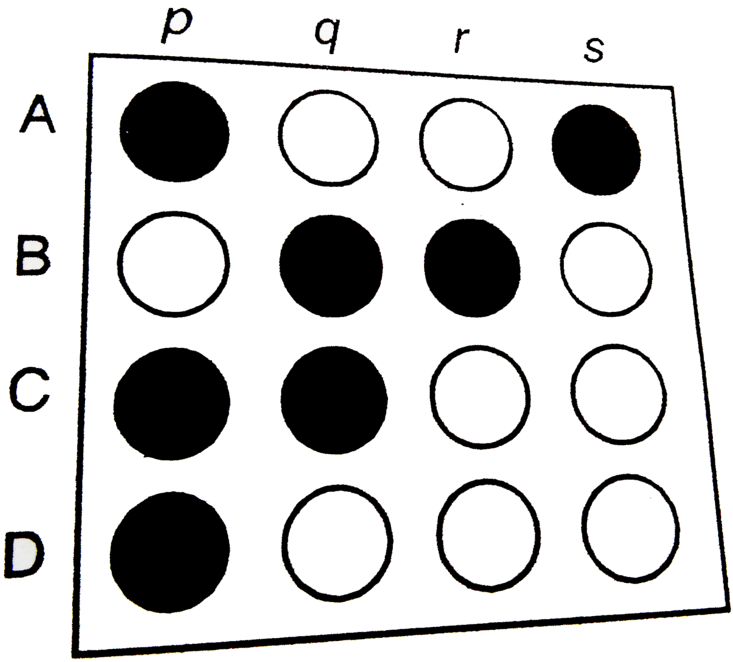
4. Here each question contains statements given in two columns which have to the matched statements in column I are labelled as A,B, C and D where as statement in column II are labelled as p,q,r and s. the answer to these questions are to be bubbled 4 x 4 matrix. if the correct matched are A-p,A-s,B-q,C-p, and D-p then the correctly bubbled matrix should look like the following


p
q
r
s
A
B
C
D

Column I	Column II
(A) Orbital angular momentum of the electron in hydrogen like atomic orbital.	(p) Principal quantum number
(B) A hydrogen like one electron wave function obeying Pauli's principle	(q) Azimuthal quantum number
(C) Shape, size and orientation of hydrogen like atomic orbital	(r) Magnetic quantum number
(D) Probability density of electron in hydrogen- like atom	(s) Electron spin quantum number

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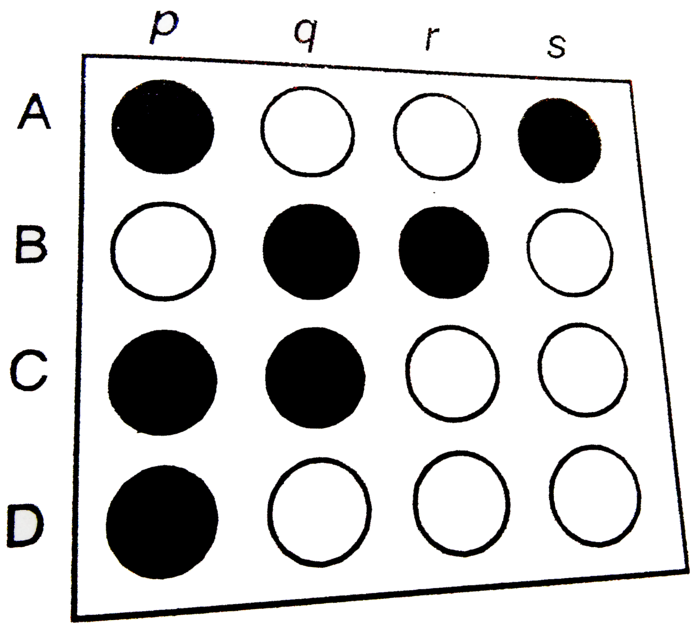
5. Here each question contains statements given in two columns which have to the matched statements in column I are labelled as A,B, C and D where as statement in column II are labelled as p,q,r and s. the answer to these questions are to be bubbled 4 x 4 matrix. if the correct matched are A-p,A-s,B-q,C-p, and D-p then the correctly bubbled matrix should look like the following



Column I	Column II
(A) Electron	(p) Negative
(B) Proton	(q) Positive charge
(C) Neutron	(r) 1.6×10^{-19} C
(D) Positron	(s) No charge.

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Integer Type Questions

1. The number of unpaired electrons in the ground state of chromium atoms is..........

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2. Number of electrons with magnetic quantum number equal to zero present in the outer most orbit of Co^{2+} are..........

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3. The maximum quantum number of electrons that can have principal quantum number, n=3 and spin quantum number $n_s = \frac{-1}{2}$ is..........

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4. The work function (ϕ) of some metals is listed below . The number of metals which will show photoelectric effect when light of 300 nm wavelength falls on the metal is :

Metal	Li	Na	K	Mg	Cu	Ag	Fe	Pt	W
ϕ (eV)	2.4	2.3	2.2	3.7	4.8	4.3	4.7	6.3	4.75

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Reason Assertion Types MCQs

1. Assertion (A) : A spectral line will be seen for $2p_x$-$2p_y$ transition

Reason (R) : Energy is raleased in the form of wave of light when the electron drops from $2p_x$, to $2p_y$ orbital.

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

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

C. A is true but R is false

D. Both A and R are false

Answer: D

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2. Assertion (A) : The position of electron can be determined with the help of an electronic microscope.

Reason (R) : The product of uncertainty in momentum and the uncertainty in the position of an electron cannot be less than a finite limit.

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

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

C. A is true but R is false

D. A is false but R is true

Answer: D

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3. Assertion (A) : A single $.^{12}C$ atom has mass exactly 12 amu and a mole of these atoms has a mass of exactly 12 gram.

Reason (R) : A mole of atoms of any element has a mass in gram equal to the atomic mass of the element.

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

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

C. A is true but R is false

D. A is false but R is true

Answer: A

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4. Assertion (A) : In CO molecule, 12 parts by mass of carbon combine with 16 parts by mass of oxygen and in CO_2, 12 parts by mass of carbon combine with 32 parts by mass of oxygen.

Reason (R) : When two elements combine separately with a fixed mass of a third element, then the ratio of their masses in which they do so is either the same or whole number multiple of the ratio in which they combine with each other.

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

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

C. A is true but R is false

D. A is false but R is true

Answer: B

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5. Assertion (A) : An orbital cannot have more than two electrons, more over if an orbital has two electrons they must have opposite spins.

Reason (R) : No elements in an atom can have same set of all four quantum numbers.

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

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

C. A is true but R is false

D. A is false but R is true

Answer: A

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6. Assertion (A) : The pairing of electrons in the orbitals of a particular subshell does not occur unitl all the orbitals of the subshell are singly occupied.

Reason (R) : Singly occupied orbitals must have the electrons with parallel spins.

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

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

C. A is true but R is false

D. A is false but R is true

Answer: B

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7. Assertion: Electrons are ejected from a certain metal when either blue or violet light strikes the metal surface. However only violet light cause electron ejection from a second metal.

Reason: The electrons in the first metal requires less energy for ejection.

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

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

C. A is true but R is false

D. A is false but R is true

Answer: A

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8. Statement-I : The configuration of B atom cannot be $1s^2 2s^3$.

Because

Statement-II : Hund's rule demands that the configuration should display maximum multiplicity.

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

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

C. A is true but R is false

D. A is false but R is true

Answer: D

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9. Assertion (A) : In Rutherford's experiment, α particles from a radium source were allowed to fall on a $10^{-4}mm$ thick gold foil. Most of the particles passed straight through the foil.

Reason (R) : The entire positive charge and nearly whole of the mass of an atom is concentrated in the nucleus.

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

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

C. A is true but R is false

D. A is false but R is true

Answer: B

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10. The cation energy of an electron is largely determined by its principal quantum number.

The principal quantum number n is a measure of the most probable distance of finding atomic the electron around the nucleus.

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

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

C. A is true but R is false

D. A is false but R is true

Answer: A

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11. Assertion (A) : The isotopes are the atoms of the same element with different atomic masses. They require different positions in the periodic table.

Reason (R) : Variable number of neutrons in the nuclei of the atoms of same elements leads to the different atomic masses.

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

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

C. A is true but R is false

D. A is false but R is true

Answer: D

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12. Assertion (A) : Neutrons have no charge but protons are positively charged, hence net result is repulsion in them in the nucleus of an atom. In the presence of this repulsion the nucleus is highly stable.

Reason (R) : The pair of nucleous (neutrons and protons) continuously exchanges the charge through mesons which may either be positively or negatively charged.

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

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

C. A is true but R is false

D. A is false but R is true

Answer: A

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13. Assertion (A) : p orbital is dumb- bell shaped

Reason (R) :Electron presents in p orbital can have any one of three value of magnetic quantum number i.e. $0, \ +1, \ \text{or} \ \ -1$

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

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

C. A is true but R is false

D. A is false but R is true

Answer: B

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14. Statement-I : The configuration of B atom cannot be $1s^2 2s^3$.

Because

Statement-II : Hund's rule demands that the configuration should display maximum multiplicity.

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

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

C. A is true but R is false

D. A is false but R is true

Answer: B

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15. Assertion: Radio waves can be polarised.

Reason: Sound waves in air are longitudinal in nature.

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

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

C. A is true but R is false

D. A is false but R is true

Answer: B

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16. 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. Both A and R true and R is the correct explanation of A

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

C. A is true but R is false

D. A is false but R is true

Answer: A

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17. Assertion (A) : Fe^{3+} (g) ion is more stable than $Fe^{2+}(g)$ ion.

Reason (R) : Fe^{3+} ion has more number of unpaired electrons than Fe^{2+} ion.

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

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

C. A is true but R is false

D. A is false but R is true

Answer: B

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18. Assertion (A) : When ordinary light is incident on thin oil film on the surface of water, different colours are seen.

Reason (R) : White light is composed of seven different colours.

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

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

C. A is true but R is false

D. A is false but R is true

Answer: B

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19. Assertion (A) : Hydrogen has only one electron in its 1s orbital but it produces several spectral lines.

Reason (R) : There are many excited energy levels available in H atoms.

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

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

C. A is true but R is false

D. A is false but R is true

Answer: A

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20. Assertion (A) : An orbital cannot have more than two electron

Reason (R) : The two electrons is an orbital create opposite magnetic field

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

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

C. A is true but R is false

D. A is false but R is true

Answer: B

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21. K and Cs are used in photoelectric cells.

K and Cs emit electrons on exposure to light.

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

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

C. A is true but R is false

D. A is false but R is true

Answer: A

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1. Pick out of the correct statement:

In a a cathode ray tube cathode rays

A. move from cathode to anode

B. move from anode to cathode

C. are made up of photons

D. none of these

Answer: D

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2. In a discharged tube containing only one elementary gas other than hydrogen, the different anode by particles

A. have same e/m value but not equal to unity

B. have different e/m values which are not related to each other

C. may have different e/m values which are integral multiple of lowest possible e/m value

D. have e/m value equal to unity.

Answer: C

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3. Pick out the correct statement :

In a multielectron atom

A. energy of 4s subshell is always less than 3d subshell

B. energy of 4s subshell is always more than 3d subshell

C. energy of 4s subshell is always equal to 3d subshell

D. none of these

Answer: D

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4. Out of the physical, chemical and nuclear properties of an element, which properties depend upon its electronic configuration ?

A. Only chemical properties

B. Only physical properties

C. Chemical and nuclear properties

D. Physical and chemical properties

Answer: D

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5. Pick up the correct statement about the following pairs

I : Ar and S^{2-}, II: Fe and Ni^{2+}

(At. No. Ar = 18, S = 16, Fe = 26, Ni = 28)

A. Both of these pairs contain isoelectronic species

B. Only pair (I) is isoelectronic

C. Only pair (II) is isoelectronic

D. None of the pair is isoelectronic.

Answer: B

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6. A 3p-orbital has

A. Only one nodal plane and no spherical node

B. Only one spherical node and no nodal plane

C. One nodal plane and one spherical node

D. One nodal plane and two spherical nodes.

Answer: C

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7. $1.00cm^{-1}$ represents

A. a quanta of wavelength 0.01 cm

B. $1.09 \times 10^{-23} \text{Jatom}^{-1}$ of energy

C. $6.02 \times 10^{23} Jmol^{-1}$ of energy

D. None of these

Answer: D

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8. Which of the following relates to light as wave motion as well as a stream of particles ?

A. Diffraction

B. Photoelectric effect

C. Interference

D. None of these

Answer: D

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9. Light of wavelength λ shines on a metal surface with initail X and the metal emit Y electron per second of average Z what will happen to Y and Z if X is doubled ?

A. Y will increase and Z will decrease

B. Z will increase and Y remains constant

C. Z will decrease and Y remains constant

D. Y will decrease and Z will increase.

Answer: B

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10. Light of wavelength λ shines on a metal surface with initail X and the metal emit Y electron per second of average Z what will happen to Y and Z if X is doubled ?

A. Z will remains constant and Y will increase

B. Both Z and Y will remain constant

C. Z will decrease and Y will increase

D. Both Z and Y will increase

Answer: A

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11. Number of possible orbital diagrams for the configurate

$1s^2 2p^1$ is

A. One

B. Two

C. Four

D. Six

Answer: D

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12. Pick out of the correct statement about de Broglie concept

A. It is applicable only for submicroscopic objects in the range of atoms, molecules and sub atomic particles

B. It can accurately be applied to motion of an electron around the nucleus

C. It is applicable only for microscopic particles

D. None of these

Answer: D

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13. Which d-orbtial has its four lobes along the axis?

A. d_{xy}

B. d_{yz}

C. d_{zx}

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

Answer: D

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14. Which d-orbital does not have four lobes?

A. $d_z 2$

B. l

C. m

D. s

Answer: A

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15. Which quantum number is not related with Schrodinger equation :-

A. n

B. l

C. m

D. s

Answer: D

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