CHEMISTRY

BOOKS - MODERN PUBLICATION

CHEMISTRY (KANNADA ENGLISH)

STRUCTURE OF ATOM

Multiple Choice Questions Level I

1. Which of the following statements is not correct regarding cathode rays?

A. The rays carry negative charge

B. The charge/ mass of these rays is considerably smaller than for positive rays

C. The rays produce mechanical effect

D. The charge /mass ratio is independent of the nature of the gas taken in the discharge tube.

Answer: B

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2. The number of protons, electrons and neutrons in $^{35}_{17}Cl^{-}$ are respectively

A. 17,18,18

B. 17,17,18

C. 17,18,17

D. 17,18,38

Answer: A

3. The nucleides X and Y are isotonic to each other with mass numbers 70 and 72 respectively. If the atomic number of X is 34, then that of Y would be

A. 32

B. 34

C. 36

D. 38

Answer: C

4. Neutron was discovered by:

A. J.J Thomson

B. Chadwick

C. Rutherford

D. Millikan

Answer: B

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5. Isobars have same numbers of

A. protons

B. electrons

C. nucleons

D. neutorns.

Answer: C

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6. Which one of the following conclusions could not be derived from Rtherford's α- particle scattering experiments?

A. Most of the space in the atom is empty.

B. The radius of the atom is about 10^{10} m while that of nucleus is 10^{-15} m

C. Electrons move in a circular path of fixed energy called orbits.

D. Electrons and the nucleus are held together by electrosatic forces of attraction.

Answer: C

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7. Which of the following statements is not correct about the characteristics of cathode rays?

A. They start from the cathode and move towards the anode.

B. They travel in straight line in the absence of an external electricla or magnetic field.

C. Characteristics of cathode rays do not depend upon the material of electrodes in cathode ray tube.

D. Characteristics of cahode rays depend upon the nature of gas present in the cathode ray tube.

Answer: D

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8. Which of the following statement about the electron is incorrect?

A. It is a negatively charged particle

B. The mass of elecron is equal to the mass of neutron.

C. It is a basic consitituent of all atoms

D. It is a constituent of cathode rays.

Answer: B

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9. Which of the following properties of atom could be explained correctly by Thomson model of atom?

A. Overal neutrality of atom.

B. Spectra of hydrogen atom.

C. Positioni of electons, protons and neutrons in atom.

D. Statbility of atom.

Answer: A

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10. Two atoms are said be isobars if

A. they have same atomic number but different mass number.

B. they have same number of elecrons but different number of neutrons.

C. they have same number of neutrons but different number of electrons.

D. sum of the number of protons and neutrons is same but the number of protons is different.

Answer: D

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11. Which of the following statement is not correct regarding electromagnetic spectrum?

A. the velocity of X-rays ismore than that of microwaves

B. Infra-red radiations have larger wavelength than cosmic rays

C. The frequency of microwaves is less than that of ultra violet rays

D. X-rays have larger wave number than micorwaves.

Answer: A

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12. The wave number of a wave of light is $2.0 \times 10^{14} cm^{-1}$. The frequency of this light is

A. $6.6 \times 10^{3} s^{-1}$

B. $6.6 \times 10^{-3} e^{-1}$

C. $6.0 \times 10^{24} s^{-1}$

D. $6.0 \times 10^{-14} s^{-1}$

Answer: C

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13. The energy of photon of reddish light having wavelength 660nm is ($h = 6.6 \times 10^{-34} Js$)

A. $1 \times 10^{-19} J$

B. $3.0 \times 10^{-18} J$

C. $1 \times 10^{19} J$

D. $3.0 \times 10^{-19} J$

Answer: D

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14. The wavelength of radiation having frequency 1000 Hz is

A. $3 \times 10^{13} cm$

B. $3.0 \times 10^{7} cm$

C. $3000 Å$

D. $300 nm$

Answer: B

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15. The wave length of a beam of light is $25.0m$ m. Its wave number is

A. $4.0 \times 10^{1} m^{-1}$

B. $4.0 \times 10^{6} cm^{-1}$

C. $4.0 \times 10^{6} m^{-1}$

D. $25.0 \times 10^{4} cm^{-1}$

Answer: A

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16. The ratio of energy of a photon of 2000Å wavelengt radiation to that 4000Å radiation is

A. 43834

B. 4

C. 43832

D. 2

Answer: D

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

A. intensity

B. wavelength

C. frequency

D. velocity

Answer: C

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18. The kinetic energy of the photoelectrons depends upon:

A. intensity of radiation

B. frequency of radiation

C. the intensity and frequency of radiation

D. None of these

Answer: B

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19. Which of the following metal exhibits photoelectric effect readily?

A. Cs

B. Na

C. Li

D. Mg

Answer: A

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20. The number of photons of light having wave number x in 1J of energy source is (Plank's constant=h, velocity of light =c)

A. hcx

B. hc/x

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

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

Answer: D

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21. The kinetic energy of electrons ejected by using light having frequency equal to threshold frequency (v_0) is

A. hv_0

B. Almost zero

C. very large

D. h / v_0

Answer: B

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22. A photon of radiation of wavelength 600 nm has an energy E. The wavelength of photon of radiation having energy 0.25 E is

A. 600 nm

B. 2400 nm

C. 150 nm

D. 300 nm

Answer: B

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23. The threshold wavelength for the ejection of electron for metal X is 330 nm. The work function for photoelectric emission from metal X is $\left(h = 6.6 \times 10^{-34} Js\right)$

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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24. In a photoelectric effect, the energy of the photon striking a metallic surface is $5.6 \times 10^{-19} J$. The kinetic energy of the ejected electron is $12.0 \times 10^{-20} J$. The work function is

A. $6.4 \times 10^{-19} J$

B. $6.8 \times 10^{-19} J$

C. $4.4 \times 10^{-19} J$

D. $6.4 \times 10^{-20} J$

Answer: C

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

A. 4×10^{1}

B. 3×10^{7}

C. 2×10^{-25}

D. 5×10^{-18}

Answer: A

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26. The electron level which allows the hydrogen to absorb photons but not to emit is

A. 3s

B. 2p

C. 1s

D. 3d

Answer: C

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27. Bohr's model can explain

A. the spectrum of hydrogen atom only

B. the 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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28. The limiting line in Paschen series corresponds to

A. $n_1 = 2, n_2 = 3$

B. $n_1 = 3, n_2 = 4$

C. $n_1 = 3, n_2 = 10$

D. $n_1 = 3, n_2 = \infty$

Answer: D

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29. A spectral line obtained when an electron jumps from sixth energy level to first energy level in spectrum of hydrogen atom falls in:

A. visible region

B. ultra violet region

C. infra red region

D. None of these

Answer: B

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30. The energy of the elecron in an orbit of hydrogen atom is given by

$$E_n = -\frac{1311.8}{n^2} kJ\text{mol}^{-1}$$

The ionisation energy of hydrogen atom is:

A. $1311.8 kJ\text{mol}^{-1}$

B. $-327.9 kJ \text{mol}^{-1}$

C. $145.7 kJ \text{mol}^{-1}$

D. $-1311.8 kJ \text{mol}^{-1}$

Answer: A

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31. Which of the following transition in H-atom corresponding to absorption line of highest frequency?

A. n=1 to n=2

B. n=3 to n=4

C. n=2 to n=1

D. n=2 to n=3

Answer: A

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32. The energy of the second Bohr orbit of H atom is -3.41 eV. The energy of the second Bohr orbit of He^+ ion is

A. $-0.85eV$

B. $-1.70eV$

C. $-6.82eV$

D. $-13.64eV$

Answer: D

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33. The wave number of the shortest wavelength of absorption specturm of H-atom is (Rydberg constant $= 109700cm^{-1}$)

A. $109700cm^{-1}$

B. $3/4 \times 109700 cm^{-1}$

C. $1/2 \times 109700 cm^{-1}$

D. $9/10 \times 109700 cm^{-1}$

Answer: A

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34. The wave number of the series limiting line for the Lyman series for hydrogen atom is (R $= 109678 cm^{-1}$)

A. $82259 cm^{-1}$

B. $109678 cm^{-1}$

C. $1.2157 \times 10^{5} cm$

D. $9.1176 \times 10^{-6} cm$

Answer: B

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35. In H-atom electron jumps form 3 to 2 energy level, the energy released is

A. 3.03×10^{-19} J/atom

B. 1.03×10^{-19} J/atom

C. 3.03×10^{-12}J/atom

D. 6.06×10^{-19}J/atom

Answer: A

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36. When monochromatic X-rays are allowed to fall on some lighter element, the scattered X-rays have wavelengths larger than incident rays. This effect is know as:

A. Photoelectric effect

B. Zeeman effect

C. Stark effect

D. Compton effect

Answer: D

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37. The ratio of the radius of Bohr first orbit for the electron orbiting the hydrogen nucleus to that of the electron orbiting the deuterium nucleus (mass nearly twice that of H nucleus) is approximately

A. $1:1$

B. $1:2$

C. $2:1$

D. $1:4$

Answer: A

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38. The ratio of radii of the first three Bohr orbits of H-atom is :

A. $1:2:3$

B. $1:4:9$

C. $1:3:27$

D. $1:\sqrt{2}:\sqrt{3}$

Answer: B

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39. The wavelength of the first line of Balmer series of H-atom of 6561Å. The wavelength of the second line of the series is

A. 13122Å

B. 3280Å

C. 4860Å

D. 2180Å

Answer: C

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40. The energy of an electron in the second Bohr orbit of H-atomis -E. The enrgy of the electron in the Bohr's first orbit is

A. $-E/4$

B. $-4E$

C. $4E$

D. $-2E$

Answer: B

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41. The transition of electron in hydrongen atom having minimum wavelength is :

A. $n_3 \rightarrow n_2$

B. $n_4 \rightarrow n_3$

C. $n_5 \rightarrow n_4$

D. All have the same wavelength

Answer: A

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42. What transition in He^+ ion shall have the same wave number as the first line in Balmer series of hydrogen atom?

A. $4 \rightarrow 3$

B. $6 \rightarrow 4$

C. $6 \rightarrow 3$

D. $6 \rightarrow 2$

Answer: B

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43. The wave number of the shortest wavelength transition in the Balmer series of H atom is

A. $27419.5cm^{-1}$

B. $219356cm^{-1}$

C. $12186.2cm^{-1}$

D. $24372.4cm^{-1}$

Answer: A

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44. The ratio of ionisation energy of H and Li^{2+} is

A. $1:4$

B. $1:3$

C. $1:9$

D. $9:1$

Answer: C

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45. The wavelength of a spectral line for an electronic transition is inversely related to:

A. velocity of electron undergoing transition

B. number of electrons undergoing transition

C. the difference in energy levels involved in the transition.

D. None of these

Answer: C

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46. 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. $-82kJmol^{-1}$

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

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

Answer: B

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47. The energy of an electron in te first Bohr orbit of H atom is -13.6eV. The possible energy values(s) of the excited state(s) for electrons in Bohr orbits of hydrogen is (ar)

A. $-3.4eV$

B. $-4.2eV$

C. $-6.8eV$

D. $+6.8eV$

Answer: A

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48. What is the dimension of Planck's constant?

A. Force $\times$ time

B. energy $\times$ distance

C. energy/frequency

D. energy/time

Answer: C

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49. 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 the 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 the energy required for the transition from n=7 to n=9 state.

Answer: C

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50. How many spectral lines are produced in the spectrum of hydrogen atom from 5th energy level?

A. 5

B. 10

C. 15

D. 4

Answer: B

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51. For each value of l, the number of m value is

A. 2l

B. nl

C. $2l + 1$

D. $2l^2$

Answer: C

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52. The number of orbitals in $n = 4$ is

A. 2

B. 8

C. 16

D. 32

Answer: C

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53. Which of the following statement is incorrect?

A. The e/m ratio for anode rays is not constant.

B. The e/m ratio for anode rays is considerably smaller than elecrons.

C. Millikan oil drop experiment showed particle nature while diffraction studies showed wave nature of electron.

D. the wavelength associated with an electron would become equal of the weavelength associated with a proton when velocity of proton is about 1836 times that of electron.

Answer: D

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54. Which of the following notations, describing a subshell with the quantum numbers n and l, is not correct?

A. $n = 3, l = 2, \rightarrow 3d$

B. $n = 5, l = 0 \rightarrow 5s$

C. $n = 4, l = 3 \rightarrow 4f$

D. $n = 5, l = 4 \rightarrow 5f$

Answer: D

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55. Which of the following sets of quantum numbers represents an impossible arrangement?

A.

n	l	m	s
3	2	-2	$+1/2$

B.

n	l	m	s
4	0	0	$-1/2$

C.

n	l	m	s
5	2	0	$+1/2$

D.

n	l	m	s
3	3	$+2$	$+1/2$

Answer: D

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56. What is the lowest value of n that allows the g-subshell to exists?

A. n=1

B. n=4

C. n=3

D. n=5

Answer: D

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57. The quantum numbers for the designation of 3d are:

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

B. $n = 3, l = 3$

C. $n = 4, l = 1$

D. $n = 3, l = 2$

Answer: D

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58. The quantum number not obtained from Schrodinger wave equation is

A. n

B. l

C. m

D. s

Answer: D

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59. The energy of an electron is specified by

A. azimuthal quantum number

B. magnetic quantum number

C. principal quantum number

D. spin quantum number.

Answer: C

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60. If the number of values of m is seven, the value of azimuthal quantum number should be:

A. 3

B. 4

C. 2

D. 1

Answer: A

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61. Among the following particles, which will have the shortest wavelength when accelerated by one million eV?

A. Neutron

B. Tritium atom

C. α- particle

D. Electron

Answer: C

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62. Which of the following has the largest de Broglie wavelength provided all have equal velocity?

A. Carbon dioxide molecule

B. Ammonia molecule

C. nitrogen molecule

D. Oxygen molecule

Answer: B

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63. The Schrodinger wave equation for an electron in a potential field V, in three demensions is:

A.

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

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

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.

$$\frac{\partial^2 \psi}{\partial x^2} + \frac{\partial^2 \psi}{\partial y^2} + \frac{\partial^2 \psi}{\partial z^2} + \frac{8\pi^2 m}{h^2} + [E + V]\psi = 0$$

Answer: C

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64. The first energy shell that can have f-orbital is:

A. First

B. Second

C. Third

D. fourth

Answer: D

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65. If the uncertainty in the positioin of an electron is zero, the uncertainty in its momentum would be

A. zero

B. $> h/4\pi$

C. $< h/4\pi$

D. infinite

Answer: D

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66. Heisenberg uncertainty principle precludes the simultaneous measurement of

A. Energy and velocity

B. Radius and charge density

C. Position and momentum

D. Probability and intensity.

Answer: C

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67. If the Planck's constant is $h = 6.6 \times 10^{-34} J$, the de Broglie wavelength of a particle having momentum of $3.3 \times 10^{-24} kgms^{-1}$ will be

A. $0.02Å$

B. $0.5Å$

C. $2Å$

D. $500Å$

Answer: C

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68. The wavelength associated with a ball of mass 100 g moving with a speed of 10^3 cm $\sec^{-1}$ ($h = 6.6 \times 10^{-34} Js^{-1}$) is

A. $6.6 \times 10^{32} cm$

B. $6.6 \times 10^{-27} cm$

C. $6.6 \times 10^{27} cm$

D. $6.6 \times 10^{-32} cm$

Answer: D

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69. The de Broglie wavelength of an electron is 66 nm. The velocity of the electron is $\left(h = 6.6 \times 10^{-34} kgm^2 s^{-1} m = 9.0 \times 10^{-31} kg\right)$

A. $1.84 \times 10^{-14} ms^{-1}$

B. $1.1 \times 10^{-4} ms^{-1}$

C. $5.4 \times 10^{3} ms^{-1}$

D. $1.1 \times 10^{4} ms^{-1}$

Answer: B

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70. The uncertainty in the momentum of an electron is $1.0 \times 10^{-5} kgms^{-1}$. The uncertainty in position will be $\left(h = 6.6 \times 10^{-34} kgm^2 s^{-1}\right)$

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

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

C. $5.25 \times 10^{-30} m$

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

Answer: A

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71. The momentum of a particle having a de-Broglie wavelenth of 10^{-17}m is ($h = 6.625 \times 10^{-34} Js$)

A. $6.625 \times 10^{-17} kgms^{-1}$

B. $3.3125 \times 10^{-7} kgms^{-1}$

C. $13.25 \times 10^{-17} kgm^{-1}$

D. $26.5 \times 10^{-7} kgms^{-1}$

Answer: A

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72. Which of the following condition is incorrect for well behaved wave function ψ?

A. ψ must be single valued at any particlular point

B. ψ must be finite

C. ψ must be positive

D. ψ must be a continous function of its coordinates.

Answer: C

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73. At $200^{\circ}C$, the velocity of hydrogen molecules is 2.4×10^5 cm/sec. In this case the de-Broglie wavelength is about

A. 1Å

B. 1000Å

C. 100Å

D. 10Å

Answer: A

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74. The uncertainty in the position of an electron (mass $= 9.1 \times 10^{-28} g$) moving with a velocity of $3.0 \times 10^{4} cms^{-1}$ accurate up to 0.011% will be

A. 1.92 cm

B. 7.68 cm

C. 0.175 cm

D. 3.85cm

Answer: C

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75. Principal, magnetic and azimuthal quantum numbers are respectively related to:

A. size, orientation, shape

B. size, shape, orientation

C. shape, size and orientation

D. None of these

Answer: A

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76. Given: Mass of electron $= 9.11 \times 10^{-31} kg$

Plank's constant $= 6.626 \times 10^{-34} Js$

The uncertaintly involved in the measurement of velocity with in a distance of $0.1 Å$ is

A. $5.79 \times 10^{7} ms^{-1}$

B. $5.79 \times 10^{8} ms^{-1}$

C. $5.79 \times 10^{5} ms^{-1}$

D. $5.79 \times 10^{6} ms^{-1}$

Answer: D

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77. The orientation of an atomic orbital is governed by

A. spin quantum number

B. magnetic quantum number

C. principal quantum number

D. Azimuthal quantum number

Answer: B

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78. A body of mass x kg is moving with a velocity of 100 m/s.Its de Broglie wavelength is 6.62×10^{-35}m . Hencex is $\left[h = 6.2 \times 10^{-34} Js\right]$

A. $0.25kg$

B. $0.15kg$

C. $0.2kg$

D. $0.1kg$

Answer: D

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

Answer: C

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

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

A. 1

B. 2

C. 3

D. 4

Answer: A

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81. The number of unpaired electrons in P-atom is

A. 1

B. 3

C. 5

D. 0

Answer: B

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

A.

n	l	m
2	1	0

B.

n	l	m
2	1	1

C.
n	l	m
3	1	1

D.
n	l	m
3	0	0

Answer: C

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83. The two electrons present in an 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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84. P^{3-} ion has the valence shell electronic configuration

A. $3s^2 3p^3$

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

C. $2s^2 2p^3$

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

Answer: B

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85. The maximum number of 3d-electrons having spin quantum number $s = +1/2$ is

A. 10

B. 5

C. 2

D. 1

Answer: A

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86. The electronic configuration for Ca^{2+} ion is :

A. $[Ne]3s^2 3p^6$

B. $[Ne]3s^2 3p^4$

C. $[Ar]4s^2$

D. [Ar]3s^(2)3p^(6)`

Answer: A

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87. The electronic configuration of an element with atomic number 26 is

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

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

C. $[Ar]3d^8$

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

Answer: C

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88. Which of the following species has maximum number of unpaired electrons?

A. $Na(Z = 11)$

B. $Cl(z = 17)$

C. $P(Z = 15)$

D. O(Z=8)

Answer: A

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89. How many electrons in a given atom can have the following quantum numbers?

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

A. 1

B. 18

C. 14

D. 7

Answer: C

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90. The number of unpaired electrons in chromium (Z=24) is :

A. 4

B. 3

C. 6

D. 5

Answer: C

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91. Which of the following is not possible electronic configuration for an atom?

A. $1s^2, 2s^2, 2p_x^1, 2p_7^1$

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

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

D. $1s^2, 2s^2, 2p_y^1, 2p_z^1$

Answer: C

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92. How many electrons in an atom can have n=3,l=2,m=-1?

A. 2

B. 6

C. 10

D. 1

Answer: A

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93. Consider the electronic configuration:

$1s^2 2s^2 2p_x^2$

It violates

A. Aufbalu principle

B. Hund's rule

C. Pauli's exclusion principle

D. It is correct.

Answer: B

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94. The ground state electronic configuration of oxygen in Li_2O is

A. $1s^2 2s^2 2p^4$

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

C. $1s^2 2s^2 2p^2$

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

Answer: B

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95. With the increasing principal quantum number, the energy diference between adjacent energy levels in H-atiom,

A. decreases

B. increases

C. remains constant

D. decreases for low values of Z and increaes for higher values of Z

Answer: A

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96. The maximum number of electrons in a sub-shell is given by the expression:

A. $4l - 2$

B. $4l + 2$

C. $2l + 1$

D. $2n^2$

Answer: B

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97. The number of unpaired electrons in Cu^+ (Z=29) is

A. 1

B. 2

C. 0

D. 3

Answer: C

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98. Which of the followng has maximum number of unpaired electrons?

A. Mg^{2+}

B. Ti^{3+}

C. V^{3+}

D. Fe^{2+}

Answer: D

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99. The total number of maxima in the radial probabililty disribution curve of 2s is :

A. one

B. two

C. six

D. four

Answer: B

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100. How many electrons can have l=2and n=5?

A. 32

B. 18

C. 10

D. 6

Answer: C

101. For H-atom, the energies of electronic levels depend upon

A. n+l values

B. l+m values

C. n only

D. l only

Answer: C

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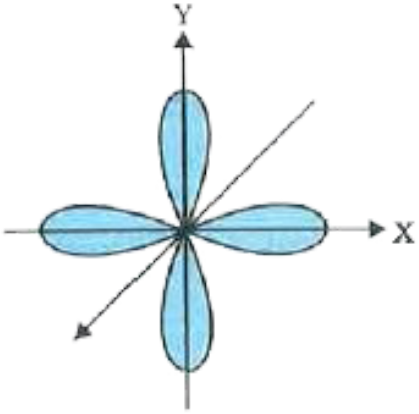
102. The figure is representation of the shape of



A. $3d_{xy}$ orbital

B. $3d_z^2$orbital

C. $2p_z$ orbital

D. $3d_{x^2-y^2}$ orbtial

Answer: D

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103. In the energy level sequence for a multi electron atom, 4f- orbial lies between

A. 6s and 5d

B. 5p and 5d

C. 4p and 5p

D. 5d and 6d

Answer: A

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104. The correct electronic configuration for $Ni^{2=}$ (Z=28) is

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

B. $[Ar]4s^2 3d^8$

C. $[Ar]3d^8$

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

Answer: C

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105. A 2p-orbital has the following node/nodes:

A. 2 spherical

B. 1 spherical

C. 1 planar

D. 1 planar and 1 spherical

Answer: C

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106. The electronic configuration for Se^{2-} (Z=34) ion is

A. $[Ar]3d^{10}4s^24p^4$

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

C. $[Ar]3d^{10}4s^24p^6$

D. $[Ar]3d^{10}$

Answer: C

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

A. $Cu^{2+}(Z = 29)$

B. $Fe^{3+}(Z = 26)$

C. $Fe(Z = 26)$

D. $P(Z = 15)$

Answer: B

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108. Which of the folowing 3d-orbitals has electron density in all the three axes?

A. $3d_{xy}$

B. $3d_{z^2}$

C. $3d_{yz}$

D. $3d^{zx}$

Answer: B

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109. The maximum number of electrons in a sub shell having the same value of spin quantum number is given by

A. l^2

B. $2l + 1$

C. $4l + 2$

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

Answer: B

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110. Which one of the following is nearest to the nucleus?

A. 6s

B. 4f

C. 5d

D. 6p

Answer: A

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111. Presence of three unpaired electrons in phosphorus (Z=15) can be explained by

A. Aufbau principle

B. Hund's rule

C. Pauli exclusion principle

D. Bohr-Bury rule

Answer: B

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112. Which of the following has zero electron density in xy-plane?

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

B. $d_z 2$

C. p_z

D. d_{xy}

Answer: C

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113. An electron has spin quantum number $+1/2$ and a magnetic quantum number -1. It cannot be present in

A. s-orbital

B. p-orbital

C. d-orbital

D. f-orbital

Answer: A

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114. The electronic configuration of an element (M) is

$(1s^2 2s^2 2p^6 3s^2 3p^6 3d^5 4s^1$

This represents :

A. Excited state

B. Ground state

C. Anionic form $\left(M^-\right)$

D. Cationic for $\left(M^{2+}\right)$

Answer: B

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115. Orbital angular momentum depends upon

A. l values

B. l+m values

C. n and l

D. l and m

Answer: B

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116. The maximum probability of finding electron in d_{xy} orbital is,

A. along the x axis

B. along the y-axis

C. at an angle of 45° form the x and y -xis

D. along x and y-axis

Answer: C

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117. In an atom,the signs of lobes indicate the

A. sign of charges

B. sign of probability disribution

C. sign of the wave function

D. presence of absence of electron.

Answer: C

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118. If n=6, the correct sequence for filling of electrons will be:

A. $ns \to (n-2)f \to (n-1)d \to np$

B. $ns \to (n-1)d \to (n-2)f \to np$

C. $ns \to (n-2)f \to np \to (n-1)d$

D. $ns \rightarrow np \rightarrow (n-1)d \rightarrow (n-2)f$

Answer: A

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119. Maximum number of electrons in a subshell with l=3 and n=4 is

A. 12

B. 14

C. 16

D. 10

Answer: B

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120. The ground state electronic configuration for chromium atom (z=24) is

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

B. $[Ar]\left(3d^4\right)4s^2$

C. $[Ar]3d^6$

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

Answer: A

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121. Which of the following electronic configuration is/are wrong?

1. $1s^2 2s^2 2p_x^2 2p_y^1$ (for nitrogen)

2. $1s^2 2s^2 2p_x^2 2p_y^1 2p_z^1$(for oxygen)

3. $1s^2 2s^2 2p^6 3s^2 3p^6 3d^5 4s^1$ (for chromium)

4. $1s^2 2s^2 2p^6 3s^2 3p^6 3d^6 4s^2$ (for iron)

A. 1 and 3

B. 3 and 4

C. 1 only

D. 2 only

Answer: C

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122. How many unpaired electrons are present in tin (z=50)?

A. 3

B. 5

C. 2

D. 4

Answer: C

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123. Which of the following species is diamagnetic?

A. $Ti^{2+}(Z = 22)$

B. $Zn^{2+}(Z = 30)$

C. $Ni^{2+}(Z = 28)$

D. $Cr^{3+}(Z = 24)$

Answer: B

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124. ^{36}Kr has the electronic configuration as $[Ar]3d^{10}4s^24p^6$. The next 37th electron will go into the subshell

A. 4d

B. 4f

C. 5s

D. 6s

Answer: C

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Multiple Choice Questions Level Ii

1. The electron configuration in which Aufbau principle is violated is:

A. 

B. 

C. 

D. 

Answer: B

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2. The maximum number of electrons theoritically possible for seventh principal shell is

A. 49

B. 196

C. 86

D. 98

Answer: D

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3. The quantum numbers for the valence electron of an atom are

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

The element is

A. Calcium

B. Sodium

C. Lithium

D. Potassium

Answer: B

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4. The splitting of the spectral lines under the influence of magnetic field is called

A. Zeeman effect

B. Compton effect

C. Photoelectric effect

D. Difraction.

Answer: A

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5. The number of electrons in the highest principal energy level for an element(Z=26) is

A. 8

B. 6

C. 2

D. 16

Answer: C

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6. Which of the following is not characteristic of X-rays?

A. The radiations can ionise the gas

B. It causes ZnS to fluorescence

C. Deflected by electric and magnetic fields

D. Have wave length shorter than ultraviolet

Answer: C

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7. The ground state electronic configuration of Fe^{3+} (g) ion is:

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

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

C. $[Ar]3d^5$

D. $[Ar]3d^6$

Answer: C

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8. The number of spherical nodes in a 4s-orbital in hydrogen atom is:

A. 0

B. 1

C. 3

D. 4

Answer: C

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9. The dipositive meal ion has the outermost configuration $3d^{10}4s^{0}$.The name of the element is:

A. Copper

B. Silver

C. Nickel

D. Zinc

Answer: D

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10. How many electrons can have the values n=2, l=1,and $s = +1/2$ in the configuration $1s^2 2s^2 2p^3$?

A. 1

B. 3

C. 5

D. 7

Answer: B

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11. An electron will have highest energy with which one of the followng sets of four quantum numbers?

A.

n	l	m	s
3	2	1	$+\frac{1}{2}$

B.

n	l	m	s
4	2	-1	$+\frac{1}{2}$

C.

n	l	m	s
4	2	0	$-\frac{1}{2}$

D.

n	l	m	s
5	0	0	$-\frac{1}{2}$

Answer: B

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12. The thresthold frequencey for photoelecric emission of electrons from platinum is $1.3 \times 10^{15} s^{-1}$. Which of the following statements is not correct?

A. the number of electrons ejected from the metal surface will depend upon the the intensity of radiation having frequency $\leq 1.3 \times 10^{15} s^{-1}$.

B. The radiation having energy $1 \times 10^{-20} J$ will be able to cause photoelectric efect.

C. If radiation having frequency $1.3 \times 10^{14} s^{-1}$ strikes the platinum suface, photo-electrons will not be ejected.

D. The kinetic energy of the emitted electrons will increasse with increase in frequency provided it is greater than $1.3 \times 10^{15} s^{-1}$.

Answer: A

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13. Which of the following relates to light as wave motion as well as a stream of particles?

A. Photoelecric effect

B. $E = mc^2$

C. diffraction

D. $E = hv$

Answer: D

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14. Which of the following has maximum magnetic moment?

A. $Mn^{2+}(Z = 25)$

B. $Fe(Z=26)$

C. $Fe^{2+}(Z=26)$

D. $Cr^{3+}(Z=24)$

Answer: A

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15. The electronic configuration of molybdenum (Z=42) is

A. $[Ar]3d^{10}4s^24p^5$

B. $[Kr]4d^45s^2$

C. $[Kr]4d^5 5s^1$

D. $[Kr]5d^5 5s^1$

Answer: C

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16. The total number of unpaired electrons in Rf (Z=104) are

A. 2

B. zero

C. 3

D. 5

Answer: C

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17. The number of d-electrons Fe^{2+} (Z=26) is not equal to that to the

A. p-electron in Ne(at no. =10)

B. d-electrons in Mn (at. No=25)

C. d-elecrons in Fe

D. p-electrons in F^{-} (at no of F=9)

Answer: B

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18. Light of wavelenght λ shines oinlametal surface with intensity x and the metal emits y electrons per second of average energy, z. What will happen to y and z if x is doubled?

A. y will be doubled and z will become half

B. y will remain same and z will be doubled

C. both y and z will be doubled

D. y will be doubled but z will remain same.

Answer: D

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19. The angular wave function depends upon quantum numbers.

A. n and l

B. l and m

C. n,l and m

D. m and s

Answer: B

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20. The kinetic energy of the electron emitted when light of frequency $3.5 \times 10^{15} Hz$ is made to strike on a metal surface havng threshold frequency $1.5 \times 10^{15} Hz$ is

$\left(h = 6.6 \times 10^{-34} Js\right)$

A. 1.32×10^{-18J}

B. $3.3 \times 10^{-18} J$

C. $6.6 \times 10^{-19} J$

D. $1.98 \times 10^{-19} J$

Answer: A

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21. One unpaired electron in an atom contributes a magnetic moment of 1.1 BM. The magnetic moment for chromium (Z=24)is

A. 4.4 BM

B. 1.1 BM

C. 5.5 BM

D. 6.6 BM

Answer: D

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22. Two particles A and B are in motion. If the wavelength associated with the particle A is $5.0 \times 10^{-8} m$,the wavelength of particle B having moment half of A is

A. $2.5 \times 10^{-8} m$

B. $1.25 \times 10^{-8} m$

C. $1.0 \times 10^{-7} m$

D. $1.2 \times 10^{-8} m$

Answer: C

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23. If r_1 is the radius of the first orbit of hydrogen atom, then the radii of second, third and fourth orbitals in terms of r_1 are

A. r_1^2, r_1^3, r_1^4

B. $8r_1, 27r_1, 64r_1$

C. $4r_1, 9r_1, 16r_1$

D. $2r_1, 6r_1, 8r_1$

Answer: C

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24. Number of electron in an atom having n=4 , m= 1 and $m_s = -1/2$ are

A. 16

B. 8

C. 32

D. 6

Answer: A

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25. Which of the following has a maximum number of unpaired electron?

A. Zn

B. Fe^{2+}

C. Ni^{2+}

D. Cu

Answer: B

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26. The ground state configuration of oxygen in OF_2 is

A. $1s^2 2s^2 2p^4$

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

C. $1s^2 2s^2 2p^2$

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

Answer: C

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27. The outer shell electronic configuration of palladium (Z=46) is

A. $4d^8 5s^2$

B. $4d^9 5s^2$

C. $4d^{10} 5s^0$

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

Answer: C

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28. The wave number of first line of Balmer series of H-atom is $15200 cm^{-1}$. The wave number of first Balmer line of Li^{2+} ion is:

A. $15200 cm^{-1}$

B. $60800 cm^{-1}$

C. $76000 cm^{-1}$

D. $136, 800 cm^{-1}$

Answer: D

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29. An electron of a velocity x is found to have a certain wavelength.The velocity to be possessed by the neuron to have half the de Broglie wavelength possessed by electron is:

A. $x/1840$

B. $x/920$

C. $3680x$

D. $x/3680$

Answer: A

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30. The total spin resulting from a d^7 configuration is

A. $3/2$

B. $1/2$

C. 2

D. 1

Answer: A

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31. The deBroglie wavelength of an electron travelling at 1% of the speed of light is($h = 6.6 \times 10^{-4}$Js, mass of electron $= 9.0 \times 10^{-31}$ kg

A. $24.4 \times 10^{-10} m$

B. $244nm$

C. 24.4pm

D. 244pm

Answer: D

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32. The ground state electronic configuration of the element which is isoelectronic with NO^+ is

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

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

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

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

Answer: C

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33. If radius of Bohr first orbit is x, then de Broglie wavelength of electron in 3rd orbit is nearly

A. $2\pi x$

B. $9\pi x$

C. $9x$

D. $6\pi x$

Answer: D

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34. According to Bohr's theory, the angular momentum for an electron of 5th orbit is

A. $10h/\pi$

B. $5h/2\pi$

C. $25h/\pi$

D. $5\pi/2h$

Answer: B

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35. Which of the following has electronic configuration in violation to Aufbau principle?

A. Silver (Z=47)

B. Tin (Z=50)

C. Magnanese (Z=25)

D. Arsenic (Z=33)

Answer: A

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36. Uncertainty in the position of an electron (mass $= 9.1 \times 10^{-31} kg$) moving with a velocity 300 ms^{-1} accurate upto 0.001%will be $\left(h = 6.6 \times 10^{-34} Js\right)$

A. $19.2 \times 10^{-2} m$

B. $3.84 \times 10^{-2} m$

C. $5.68 \times 10^{-2} m$

D. $1.92 \times 10^{-2} m$

Answer: D

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37. Energy of the electron in hydrogen atom is 1.5 timesas much ass the minimum energy required for its escape (13.6eV) from the atom. Wavelength of the emitted electron is

A. 3.96Å

B. 5.32Å

C. 4.60Å

D. 4.71Å

Answer: D

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38. If moving wih equal speed,the longest wavelength of the following matter waves is that for (an)

A. Elecron

B. α- kparticle

C. Proton

D. Neutron

Answer: A

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39. The orbital angular momentum of an electron in 2s orbital

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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40. For an electron having $s = 1/2$, the spin anglar momentum is

A. $\frac{\sqrt{3}h}{4\pi}$

B. $\sqrt{3}$

C. $\sqrt{2}$

D. 1

Answer: A

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41. For a particular value of azimuthal quantum number (l), the total number of magnetic quantum number (m) is given by:

A. $l = \frac{m+1}{2}$

B. $l = \frac{2m+1}{2}$

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

D. $l = \frac{m-1}{2}$

Answer: D

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42. The ratio of radius of 4th orbit of hydrogen and 3rd orbit of Li^{2+} is

A. $256:9$

B. $9:16$

C. $16:3$

D. $32:9$

Answer: C

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43. The electronic transition in the He^{+} spectrum from n=4 to n=2 corresponds to which transition in the H-spectrum?

A. n=2 to n=1

B. n=3 ton=1

C. n=4 to n=2

D. n=3 to n=2

Answer: A

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44. The ratio of the energy of the electron in the ground state of H to the electron in the 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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45. If the value of $n + l$ is more than 3 and less than 6, what will be the possible number of orbitals?

A. 10

B. 11

C. 13

D. 6

Answer: C

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46. If the shortest wavelength of H atom in Layman series is x, then the longest wavelength in Balmer series of He^+ is

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

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

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

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

Answer: C

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47. Which orbital has two angular nodal planes?

A. 2s

B. 2p

C. 3d

D. 4f

Answer: C

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48. The velocity of electron in the third Bohr orbit of hydrogen is v. The velocity of the electron in the first

orbit would be:

A. 9v

B. 3v

C. v/3

D. v/9

Answer: B

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49. The number of quanta of radiations of frequency $4.75 \times 10^{13} s^{-1}$ required to melt 100g of ice is (energy required to melt 1 g of ice is 350J)

A. 1.113×10^{23}

B. 111.3×10^{23}

C. 11.13×10^{23}

D. 1.113×10^{22}

Answer: C

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50. How many electrons in chromium (Z=24)have l=0?

A. 8

B. 6

C. 10

D. 7

Answer: D

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51. The number of radial nodes and nodal planes in 2p orbital are

A. 1,1

B. 2,1

C. 2,2

D. 0,1

Answer: A

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52. Frequency of matter waves may be expressed as

A. 2(K.E.)/h

B. (K.E.)/2h

C. K.E/h

D. $K.\ E/h^2$

Answer: A

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53. In the ground state of Cr atom(Z=24) ,the total number of orbitals populated by one or more electrons is,

A. 15

B. 16

C. 14

D. 11

Answer: A

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54. What is the kinetic energy ofan electron in second excited state of He^+? (Energy of electron in first shell of $H = -13.6eV$)

A. $-1.51eV$

B. $-6.04eV$

C. $-13.08eV$

D. $-13.06eV$

Answer: B

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55. If the total energy of anelectron in a hydrogen like atom in excited state is $-3.4eV$,then the de Broglie wavelength of the electron is

A. $6.6 \times 10^{-12}m$

B. $3 \times 10^{-10}m$

C. $6.6 \times 10^{-10}m$

D. $9.3 \times 10^{-12}m$

Answer: C

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56. When uncertainty in position and momentum are equal, then uncertainty in velocity is

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

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

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

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

Answer: C

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57. If the radius of Bohr's 4th orbit is a, then the radius of Bohr's first orbit is

A. 4a

B. a/4

C. $a^2/16$

D. a/16

Answer: D

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58. The ionisation energy of H atom is x kJ. The energy required for the electron to jump from n=2 to n=3 will be

A. 5x

B. 36x/f

C. 5x/36

D. 9x/4

Answer: C

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59. The highest excited state that an unexcited hydrogen atom can reach when they are bombarded with 12.75 eV of energy is :

A. n=2

B. n=3

C. n=4

D. n=5

Answer: C

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60. Which orbit of Be^{3+} has almost same radius as that of the ground state of H-atom?

A. Second

B. Third

C. Fourth

D. Sixth

Answer: A

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61. For d-electrons the orbital angular momentum is

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

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

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

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

Answer: A

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62. Which of the following orbial has zero orbital angular momentum.

A. 3p

B. 4s

C. 3d

D. 4f

Answer: B

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63. The velocity of an electron in Bohr's first orbital of la H-atom is $2.16 \times 10^6 ms^{-1}$. Its velocity in the second orbit would be

A. $1.08 \times 10^6 ms^{-1}$

B. $0.54 \times 10^6 ms^{-1}$

C. $4.32 \times 10^6 ms^{-1}$

D. $8.64 \times 10^6 ms^{-1}$

Answer: A

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64. The Bohr orbit radius for the H-atom (Z=1) is approximately 0.53Å. The radius for the first excited state orbit is:

A. 0.13Å

B. 1.06Å

C. 4.77Å

D. 2.12Å

Answer: D

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

A. Hund

B. Thomson

C. Rutherford

D. Sommerferd

Answer: D

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

A. 65.6 nm

B. 656nm

C. 0.565nm

D. 6.56nm

Answer: B

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67. In hydrogen atom, energy of first excited state is-3.4eV. The K.E. of the same orbit of H-atom is

A. $+3.4eV$

B. $+6.8eV$

C. $-13.6eV$

D. $+13.6eV$

Answer: A

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68. The frequency of radiation emitted when the electron falls from n=4 to n=1 in a hydrogen atom will be (given ionisation energy of $H = 2.18 \times 10^{18} J\text{atom}^{-1}$ and $h = 6.625 \times 10^{-25} Js$)

A. $1.03 \times 10^{3} s^{-1}$

B. $3008 \times 10^{15} s^{-1}$

C. $2.00 \times 10^{15} s^{-1}$

D. $1.54 \times 10^{-15} s^{-1}$

Answer: B

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69. An element X has the following isotopic composition

. $^{200}X = 90\,\%$, $^{199}X = 8.0\,\%$, $^{202}X = 2.0\,\%$ Its average atomic mass is

A. 199amu

B. 200amu

C. 201 amu

D. 202amu

Answer: B

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70. The electrons identified by quantum numbers n and l,

(i) n=3,l=0 (ii) n=4,l=0

(iii) n=3,l=2 (iv) n=3,l=1

can be placed in order of increasing energy from lowest to highest as

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

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

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

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

Answer: A

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71. A metal surface ejects electrons when hit by blue light but not when hit by green light. When the electrons be ejected if the surface is hit by yellow light?

A. Yes

B. No

C. Yes, if the beam used is quite intense

D. Yes,if the beam is allowed to fall on the surface for a longer time.

Answer: B

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72. Out of the first 80 elements,the number of elements having 3d orbitals are:

A. 10

B. 30

C. 60

D. 20

Answer: C

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73. The de Broglie wavelength of electron in second Bohr orbit is exactly equal to

A. the circumference of the orbit

B. Double the circumference of the orbit

C. Half the circumference of the orbit

D. thrice the circumference of the orbit

Answer: C

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74. The number of photons emitted per second by a 60 watt source of monochromatic light of wavelength 663 nm is $\left(h = 6.63 \times 10^{-34} Js\right)$

A. 4×10^{-20}

B. 1.5×10^{20}

C. 3×10^{-20}

D. 2×10^{20}

Answer: D

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75. The energies E_1 and E_2 of two radiations are 25 eV and 50 eV respectively. The relation beween their wavelength i.e. λ_1 and λ_2 will be

A. $\lambda_1 = \lambda_2$

B. $\lambda_1 = 2\lambda_2$

C. $\lambda_1 = 4\lambda_2$

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

Answer: B

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76. If ratio of the 1st three Bohr orbits in H is $1:4:9$, then the ratio of 1st three orbits in He^+ will be

A. 1 $0.5:2:4.5$

B. 2. $2:4:8$

C. 3. $2:3:4$

D. 4. $1:4:9$

Answer: D

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77. The element with electronic configuration of its atom $1s^2 2s^2 2p^6 3s^2 3p^6 3d^{10} 4s^1$ is:

A. Fe

B. Compton effect

C. Nickel

D. Cu

Answer: D

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78. Which of the following options does not represent ground state electronic configuration of an atom?

A. $1s^2 2s^2 2p^6 3s^2 3p^6 3d^8 4s^2$

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

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

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

Answer: B

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79. Number of angular nodes for 4 d orbital is

A. 4

B. 3

C. 2

D. 1

Answer: C

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80. Total number of orbitals associated with third shell will be_____

A. 2

B. 4

C. 9

D. 3

Answer: C

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81. The pair of ions having same electronic configuration is

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

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

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

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

Answer: B

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82. Which of the following orbitals does not make sense?

A. 6s and 5d

B. 3p

C. 2d

D. 4f

Answer: C

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83. Which of the following make up an isotonic traid?

A. ${}_{32}^{78}Ge, {}_{33}^{77}As, {}_{31}^{74}Ga$

B. ${}_{18}^{40}Ar, {}_{19}^{40}K, {}_{20}^{40}Ca$

C. ${}_{92}^{233}U, {}_{90}^{232}Th, {}_{94}^{239}Pu$

D. ${}_{6}^{14}C, {}_{8}^{16}O, {}_{7}^{15}N$

Answer: D

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84. Which of the following ion has maximum magnetic moment?

A. Mn^{2+}

B. Fe^{2+}

C. Ti^{2+}

D. Cr^{2+}

Answer: A

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85. The number of d-electrons remained in Fe^{2+} (At.no. of Fe=26)ion is

A. 4

B. 5

C. 6

D. 3

Answer: C

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86. The de Broglie wavelength of a tennis ball of mass 60 g moving with a velocity of $10ms^{-1}$ is approximately

$\left(h = 6.6 \times 10^{-34} Js\right)$

A. $10^{-31}m$

B. $10^{-16}m$

C. $10^{-25}m$

D. $10^{-33}m$

Answer: D

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87. Which of the following sets of quantum number is correct for an electron in 4f orbital?

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

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

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

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

Answer: A

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88. Consider the ground state of Cr atom (Z=24). The number of electrons with azimuthal quantum numbers,l=1 and 2 are respectively.

A. 16 and14

B. 12 and 5

C. 12 and 4

D. 16 and 5

Answer: B

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89. According to Bohr's theory, the angular momentum of an electron is 5 th orbit is

A. $1.0h/\pi$

B. $10h/\pi$

C. $2.5h/\pi$

D. $25h/\pi$

Answer: C

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90. Unertainty in the position of an electron (mass $= 9.1 \times 10^{-31}$kg) moving with a velocity $300ms^{-1}$ accurate upto 0.001% will be

$h = 6.63 \times 10^{-34} Js$

A. $5.76 \times 10^{-2}m$

B. $1.92x10^{-2}m$

C. $3.84 \times 10^{-2}m$

D. $19.2 \times 10^{-2}m$

Answer: B

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Multiple Choice Questions Level Iii

1. In an atom, an electron is moving with a speed of 6200 m/s which the position of an electron can be locates is $\left(h = 6.6 \times 10^{-34} kgm^2 s^{-1}\right.$, mass of electron $e_m = 9.1 \times 10^{-31} kg\left.\right)$

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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2. Calculate the wavelength associated with a proton moving at $1.0 \times 10^{3} m/s$. (Mass of proton $= 1.67 \times 10^{-27} kg$ and $h = 6.63 \times 10^{-34}$ Js)

A. 0.032 nm,

B. 0.40 nm

C. 2.5 nm

D. 14.0 nm

Answer: B

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3. Ionisation energy of He^+ is $19.6 \times 10^{-18} J \text{atom}^{-1}$. The energy of first stationary state (n=1) of Li^{2+} is

A. $-2.2 \times 10^{-15} \text{atom}^{-1}$

B. $8.82 \times 10^{-178} J \text{atom}(-1)$

C. $4.41 \times 10^{-16} J \text{atom}^{-1}$

D. $-4.41 \times 10^{-17} J \text{atom}^{-1}$

Answer: D

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4. The energy required to break one moleof $Cl - Cl$ bonds in Cl_2 is 242 kJ mol^{-1}. The largest wavelenth of light capable of breaking a single Cl-Cl bond is $\left(c = 3 \times 10^8 ms^{-1} \text{ and } N_A = 6.02 \times 10^{23} \text{mol}^{-1}\right)$

A. 700 nm

B. 494 nm

C. 594 nm

D. 640 nm

Answer: B

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5. 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=2 to n=1

B. n=3 to n=2

C. n=4 to n=3

D. n=3 to n=1

Answer: A

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6. A gas absorbs a photon of 355 nm and emits at two wavelengths. If one of the emissions is at 680 nm. The other is at:

A. `743 nm

B. 518 nm

C. 1035 nm

D. 325 nm

Answer: A

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7. The electrons identified by quantum numbers n and l

a. n=4, l=1

b. n=4, l=0

c. n=3, l=2

d. n=3, l=1

can be placed in order of increasing energy as:

A. a< c < b < d

B. c < d < b < a

C. d< b < c< a

D. b< d< a< c

Answer: C

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8. Energy of an electron is given by $E = -2.178 \times 10^{-18} J\left(\frac{Z^2}{n^2}\right)$. Wavelength of light required to excite an electron in an hydrogen atom from level n=1 to n=2 will be:

A. $1.214 \times 10^{-7} m$

B. $2.816 \times 10^{-7} m$

C. $6.500 \times 10^{-7} m$

D. $8.500 \times 10^{-7} m$

Answer: A

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9. The correct set of quantum numbers for the valence electrons of rubidium atom (Z=37) is

A. $5, 0, 0, +1/2$

B. $5, 1, 0, +1/2$

C. $5, 1, 1, +1/2$

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

Answer: A

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10. Which of the following is the energy of a possible excited state of hydrogen?

A. $+13.6eV$

B. $-6.8eV$

C. $-3.4eV$

D. $+638eV$

Answer: C

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Recent Examination Questions

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

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

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

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

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

Answer: B

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2. A body of mass x g is moving with a velocity of 100m/s. It de Broglie wavelength is $6.62 \times 10^{-35} m$. Hence x is $\left(h = 6.62 \times 10^{-34} J - s\right)$

A. 0.25 kg

B. 0.15 kg

C. 0.2 kg

D. 0.1 kg

Answer: D

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3. The wave number of the spectral line in emission spectral of hydrogen will be equal to 8/9 timesthe 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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4. Which one of the following sets of quantum numbers represents the highest energy level in an atom?

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

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

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

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

Answer: C

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5. If energies of the two photons are in the ratio 3:2, their wave lengths will be in the ratio of:

A. $9:4$

B. $2:3$

C. $1:2$

D. $3:2$

Answer: B

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6. 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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7. Impossible orbital among the following is

A. 2s

B. 3f

C. 2p

D. 4d

Answer: B

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8. The electronic configuration of Cu^{2+} ion is

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

B. $[Ar]3d^9 4s^0$

C. $[ar]3d^7 4s^2$

D. $[Ar]3d^8 4s^0$

Answer: B

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9. The statement that is not correct is

A. Angular quantum number signifies the shape of orbital

B. Energies of stationary states in hydrogen like atoms are inversely proportional to square root of principle of quantum number.

C. Total number of nodes for 3s orbital is three

D. The radius of first orbit of He^+ is half that of the first orbit of hydroegn atom.

Answer: C

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10. The two electrons have the following set of quantum numbers:

$$P = 3, 2, -2, +\frac{1}{2}$$

$$Q = 3, 0, 0, = \frac{1}{2}$$

Which of the following statement is true?

A. P has lesser energy than Q

B. P and Q have same energy

C. P and Q represent same electron

D. P has greater energy than Q.

Answer: D

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11. Energy associated with the first orbit of He^{+} is:

A. 8.72×10^{-18}Joules

B. 0.872×10^{-18}Joules

C. -0.872×10^{-18}Joules

D. -8.72×10^{-18}Joules

Answer: D

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