CHEMISTRY

BOOKS - ARIHANT CHEMISTRY (HINGLISH)

ATOMIC STRUCTURE

Practise Exercise

1. The charge on eletron was determined by

A. Schrodinger

B. Chadwick

C. Thomson

D. Millikan

Answer: D

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2. Deflection back of a few particles on hitting thin foil of gold shows that

A. nucleus is heavy

B. nucleus is small

C. Both a and b

D. eletrons create hindrance in the movement of $\alpha - partic \leq s$

Answer: C

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3. A photon of frequency v has momentum

A. hv/c

B. hv/v

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

D. $\frac{vc}{h}$

Answer: C

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4. The energy of one quantum of light with a wavelength of $6500\text{Å}\left(1\text{Å} = 10^{-10}\text{ cm}\right)$

A. 9.04×10^{-24} J

B. 3.02×10^{-20} J

C. 3.06×10^{-19} J

D. 6.02×10^{-20} J

Answer: C

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5. Sodium lamp emits yellow light of wavelength 5800Å the wave number of the light is

A. $1.72 \times 10^6 / m$

B. $17.2 \times 10^8 / m$

C. $5.17 \times 10^{14} / s$

D. $17.2 \times 10^7 / m$

Answer: A

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6. The ultraviolet radiation has frequency $6 \times 10^{16} / s$ The wavelength would be

A. 2×10^{6} cm

B. 5×10^{-7} cm

C. 18×10^{-26} cm

D. 2×10^{7} cm

Answer: B

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7. A radiation of 2000Å falls on the metal whose work function is 4.2 eV. Then the kinetic energy of the fastest photo eletron is

A. 6.4×10^{-10} J

B. 16×10^{-10} J

C. 1.6×10^{-19} J

D. 3.2×10^{-19} J

Answer: D

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8. The threshold wavelength for the ejection of electron from metal is 330 nm, then work function for the photoelectric emission is

A. 6×10^{-12} J

B. 6×10^{-19} J

C. 1.2×10^{-20} J

D. 1.2×10^{-18} J

Answer: B

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9. It is given that $E = \frac{2.859}{\lambda} cal/mol$ The energy associated with radiation of wavelength 4×10^{-5} m will be

A. $71.5 kcal / mol$

B. $35.75 kcal / mol$

C. $32.0 kcal / mol$

D. $7.15 kcal / mol$

Answer: A

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10. The ratio of energy of photon of $\lambda = 2000 Å$ to that of $\lambda = 4000 Å$ is

A. 2

B. 4

C. $\frac{1}{4}$

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

Answer: A

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11. Electromagnetic radiation with maximum wavelengths is :

A. infrared

B. Ultraviolet rays

C. X- rays

D. Radiowave

Answer: D

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12. The kinetic energy of proton, whose mass is 140 times that of electron and potential difference V is

A. 1 KeV

B. $1840KeV$

C. 920 KeV

D. $\frac{1}{1840}$ keV

Answer: A

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13. In first Bohr orbit of hydrogen atom, the velocity of electron would be (given that radius of first Bohr orbit is $0.53 \times 10^{-10}m$)

A. $2.2 \times 10^6 m/s$

B. $3.3 \times 10^6 m/s$

C. $1.1 \times 10^6 m/s$

D. $4.4 \times 10^6 m/s$

Answer: A

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14. Bohr atomic model explains

A. Finer details of atomic spectra

B. splitting of spectral lines in the presence of magnetic and electric field

C. spectra of hydrogen or hydrogen like atoms

D. intensity of various spectral lines

Answer: C

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15. The expression for Bohr radius of nth orbit of an atoms is

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

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

C. $r = \frac{n^2h^2}{4\pi^2mZ}$

D. $r = \frac{n^2h^2}{4\pi^2me^2}$

Answer: A

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16. The potential energy of the electron in the hydrogen atom is $-6.8eV$ The excited state in which the eletron is present is

A. first

B. second

C. third

D. none of these

Answer: A

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17. The energy required for the ionisation of excited hydrogen atom would be (in eV)

A. < 13.6

B. > 13.6

C. 13.6

D. none of these

Answer: A

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18. For hydrogen atom, radius of first Bohr's orbit is a for Li^{2+} the radius of first Bohr's orbit is

A. 27a

B. 3a

C. $\frac{a}{27}$

D. $\frac{a}{3}$

Answer: D

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19. If the velocity of an electron in the first orbit of hydrogen atom is approximately $2.2 \times 10^8 cm/s$ is velocity in the fourth orbit would be

A. $5.5 \times 10^7 cm/s$

B. $4.4 \times 10^7 cm/s$

C. $3.3 \times 10^7 cm/s$

D. $6.6 \times 10^7 cm/s$

Answer: A

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20. Energy of an eletron in hydrogen atom is given by $E = \frac{13.6}{n^2}$ eV. If n is changed from 1 to 4 then energy 1 is

A. four times that of 4

B. five times that of 4

C. sixteen times that of 4

D. equal that of 4

Answer: C

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21. The radii of neclei and atoms are known to be of the order of 10^{-13} cm and 10^{-8} cm respectively assuming them to be spherical. The fraction of atomic volume occupied by the nucleus would be

A. 10^{-15}

B. 10^{-17}

C. 10^{-14}

D. 10^{-16}

Answer: A

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22. Which of the following statements is false ?

A. Spin quantum number corresponds to two posible direction of spin

B. No two electrons in an atom may have the same set of values for the four

quantum numbers

C. Number of electrons in an atom is equal to the number of orbitals

D. The momentum and position of an electron cannot be known simultaneously

Answer: C

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23. For hydrogen atom, radius of first Bohr orbit would be

A. $9.63 \times 10^{-10} m$

B. $0.43 \times 10^{-10} m$

C. $0.50 \times 10^{-10} m$

D. $0.53 \times 10^{-10} m$

Answer: D

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24. The relation between radius of third orbit r_3 and radius of first orbit r_1 in hydrogen atom would be

A. $r_3 = 3r_1$

B. $r_3 = 9r_1$

C. $r_1 = 3r_3$

D. $r_1 = 9r_3$

Answer: B

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25. The electron of hydrogen atom is excited to certain level. When the electron returns to the first Bohr orbit, the wavelength of line emitted if the energy difference is 11.0 eV would be

A. $11.25 \times 10^{-7} m$

B. $2.2 \times 10^{-6} m$

C. $9.1176 \times 10^{-8} m$

D. $1.22 \times 10^{-7} m$

Answer: A

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

A. $4.41 \times 10^{-16} Ja \rightarrow m^{-1}$

B. $-4.41 \times 10^{-17} Ja \rightarrow m^{-1}$

C. $-2.2 \times 10^{-15} Ja \rightarrow m^{-1}$

D. $8.82 \times 10^{-17} Ja \rightarrow m^{-1}$

Answer: B

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27. Assuming atom to be a sphere, the radius of atom would be [if the apparent volume of atom of a metal is $1.23 \times 10^{-23} mL$]

A. $1.401 Å$

B. $1.942 Å$

C. $1.642 Å$

D. $1.541 Å$

Answer: A

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28. In hydrogen an electron transition takes place from $n = 2$ level $n = 3$ level. The wavelength of the line in the hydrogen spectrum would be

A. 5.485×10^{7}

B. $6.56 \times 10^{-7} m$

C. $4.57 \times 10^{14} m$

D. $0.529 \times 10^{-10} m$

Answer: B

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29. The line spectra are characteristics of

A. molecules in ground state

B. atoms in ground state

C. molecules in the excited state

D. atoms in excited state

Answer: D

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30. In Boh'r series of lines of hydrogen spectrum, the third line from the red corresponds to which one of the following inter orbit jumps of the electron for Boh'r orbit in an atom of hydrogen ?

A. $5 \rightarrow 2$

B. $4 \rightarrow 1$

C. $2 \rightarrow 5$

D. $3 \rightarrow 2$

Answer: A

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31. The wavelength of the radiation emitted when the electron jumps from 4th shell to 2nd shell is

A. 4862Å

B. 2056Å

C. $5241 Å$

D. 109700 cm

Answer: A

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32. First line of Paschen series has wave number $(R_H = 109700 / cm)$

A. $2854 \times 10^8 (Å)^{-1}$

B. $6243 \times 10^8 (Å)^{-1}$

C. $6856 \times 10^8 (\text{Å})^{-1}$

D. $3452 \times 10^8 (\text{Å})^{-1}$

Answer: C

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33. Which of the following statement is false ?

A. Violet radiations have a longer wavelength than red radiations

B. The energy of light with $\lambda = 600nm$ is lower than that of $\lambda = 500nm$

C. Spectrum of an atom is known as line spectrum

D. The wavelength associated with an electron is longer than that of proton if they have the same speed

Answer: A

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

A. photoelectric effect

B. Zeeman effect

C. Raman effect

D. Stark effect

Answer: B

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35. In the influence of electric field the splitting of spectral lines is called

A. Zeeman effect

B. Stark effect

C. photoelectric effect

D. none of these

Answer: B

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36. The visible part of electromagnetic radiations is

A. $2000\text{Å} \rightarrow 4000\text{Å}$

B. $2000\text{Å} \rightarrow 5000\text{Å}$

C. $4000\text{Å} \rightarrow 8000\text{Å}$

D. $1000\text{Å} \rightarrow 2000\text{Å}$

Answer: C

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37. In hydrogen spectrum wave number of different lines is given by $\frac{1}{\lambda} = R_H\left[\frac{1}{n_i^2} - \frac{1}{n_f^2}\right]$ where $R_H = 1.090678 \times 10^7 m^{-1}$ The wavelength of first line of Lyman series would be

A. $122 \times 10^{-7} m$

B. $9.1176 \times 10^{-8} m$

C. $12.2 \times 10^{-7} m$

D. $1.22 \times 10^{-7} m$

Answer: D

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38. The mass of a photon of wavelength 1.54Å is

A. 2.5×10^{-32} kg

B. 1.42×10^{32} kg

C. Both of these

D. None of these

Answer: B

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39. The uncertainty in the velocity of moving bullet of mass 10 g, when uncertainty in its position is 10^{-5} m is

A. $5.2 \times 10^{-28} m/s$

B. $5.2 \times 10^{-22} m/s$

C. $3 \times 10^{-28} m/s$

D. $3 \times 10^{-22} m/s$

Answer: A

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40. The momentum of a particle having de-Broglie wavelength of 6Å

A. $1.1 \times 10^{34} kg - m/s$

B. $39.6 \times 10^{-34} kg - m/s$

C. $1.1 \times 10^{-24} kg - m/s$

D. $39.6 \times 10^{-24} kg - m/s$

Answer: C

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41. When an electron is moving uniformly, it produces

A. both electric and magnetic fields

B. an electric field only

C. a magnetic field only

D. no such fields

Answer: A

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

A. Davisson

B. Heisenberg

C. de- Broglie

D. Schrodinger

Answer: C

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43. Which one of the following statements is most appropriate ?

A. Electron spins around its own axis only

B. Electron moves around the nucleus in spherical orbits

C. Electron moves around the nucleus in elliptical orbits

D. Electrons moves around the necleus in spherical or elliptical orbits spins around its own axis

Answer: D

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

A. 8

B. 14

C. 10

D. 12

Answer: B

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45. 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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46. The orbital with $n = 3$ and $l = 2$ is

A. 5d

B. 3d

C. 4d

D. 5s

Answer: B

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

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

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

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

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

Answer: D

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48. Which of the following set of quantum number is not applicable for an electron in an atom?

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

B. $n = 1l = 0m = 0s = -1/2$

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

D. $n = 1l = 1m = 1s = +1/2$

Answer: D

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49. The maximum number of electrons that d-orbital can contain is

A. 10

B. 2

C. 14

D. 6

Answer: A

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50. The shape of the orbital is determined by

A. spin quantum number

B. Magnetic quantum number

C. azimuthal quantum number

D. principal quantum number

Answer: C

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51. For the valency electron in copper, the four quantum numbers are

A. $n = 4l = 0m = 0s = +1/2$

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

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

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

Answer: A

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52. What will be the uncertainly in velocity of a cricket ball of 100 g if the uncertainly in its position is $1.65Å$?

A. $\frac{10^{-23}}{\pi} ms^{-1}$

B. $\frac{6.6}{\pi} 10^{-45} ms^{-1}$

C. $4.65 \times 10^{-43} ms^{-1}$

D. $\frac{10^{-26}}{\pi} ms^{-1}$

Answer: A

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

(i) $n = 4l = 1$

(ii) $n = 4l = 0$

(iii) $n = 3l = 2$

(iv) $n = 3l = 1$

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

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

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

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

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

Answer: A

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54. An element has atomic number 37 the electronic configuration of the element is

A. $(28)3s^2 3p^6 3d^{10} 4s^2 5s^6 4p^5$

B. $(28)3s^2 3p^6 3d^{10} 4s^2 4p^6 5s^1$

C. $(28)3s^2 3p^6 4s^2 3d^9 5s^1 4p^5$

D. None of the above

Answer: B

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55. The number of unpaired electrons in ferrous ion is

A. 5

B. 2

C. 4

D. 3

Answer: C

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56. The triad of nuclei that is isotonic is

A. ${}_{6}C^{14}, {}_{7}N^{14}, {}_{9}F^{19}$

B. ${}_{6}C^{14}, {}_{7}N^{15}, {}_{9}F^{17}$

C. ${}_{.6}C^{14}{}_{.7}N^{14}{}_{.9}F^{17}$

D. ${}_{.6}C^{12}{}_{.7}N^{14}{}_{.9}F^{19}$

Answer: B

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57. In which of the following orbital diagram Aufbau principal is not violated

A. 

B. 

C. 

D. 

Answer: B

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58. Nitrogen has electronic configuration $1s^2 2s^2 2p_x^1 2p_y^1 2p_z^1$ This is because of

A. Pauli's exclusion principle

B. $(n+1)$ rule

C. Hund's rule

D. Uncertainty principle

Answer: C

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1. Which of the following relation is incorrect regarding Bohr's theory ?

A. Velocity of electron $\propto \frac{1}{n}$

B. Frequency of revolution $\propto \frac{1}{n^2}$

C. Radius of orbit $\propto n^2 / Z$

D. Force on electron $\propto \frac{1}{n^4}$

Answer: C

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2. Bohr theory is applicable to

A. He

B. Li^{2+}

C. He^{2+}

D. None of these

Answer: B

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3. if the radius of H is 0.53Å then what will be the radius of $._3 Li^{2+}$?

A. 0.17Å

B. 0.36Å

C. 0.53Å

D. 0.59Å

Answer: A

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4. Which of the following has the largest de - Broglie wavelength given that all have equal velocity ?

A. $CO_2mo \leq c\underline{e}$

B. $NH_3mo \leq c\underline{e}$

C. Electron

D. Proton

Answer: C

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5. The wave number of a spectral line is $5 \times 10^5 m^{-1}$. The energy corresponding to this line is

A. 3.49×10^{-23} kJ

B. 4.45×10^{-24} J

C. 5.50×10^{-22} J

D. 9.93×10^{-23} kJ

Answer: D

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6. Energy of third orbit of Bohr's atom is

A. $-13.6eV$

B. $-3.4eV$

C. $-1.5eV$

D. none of these

Answer: C

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7. An electronic transition in hydrogen atom result in the formation of $H\alpha$ line of Hydrogen in Lyman series, the energies associated with the electron in each of the

orbits involved in the transition (in $kcalmol^{-1}$) are

A. $-313.6-34.84$

B. $-313.6-78.4$

C. $-78.4-34.84$

D. $-78.4-19.6$

Answer: B

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8. The velocities of two particles A and B are 0.05 and $0.02ms^{-1}$ respectively. The mass of B is five times the mass of A. The ratio of their de- Broglie's wavelength is

A. $2:1$

B. $1:4$

C. $1:1$

D. $4:1$

Answer: A

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9. Cr has electronic configuration as

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

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

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

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

Answer: B

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10. The number of waves in an orbit are

A. n^2

B. n

C. $n - 1$

D. $n - 2$

Answer: B

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11. The probability of finding the electron in the orbital is

A. $100\ \%$

B. $90 - 95\ \%$

C. $70 - 80\ \%$

D. $50 - 60\ \%$

Answer: B

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12. The velocity of electron in first orbit of H-atom as compared to the velocity of light is

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

B. $\frac{1}{100}th$

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

D. same

Answer: B

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