CHEMISTRY

BOOKS - SAI CHEMISTRY (TELUGU ENGLISH)

ATOMIC STRUCTURE

Mcq S

1. Which of the following sets of quantum numbers is correct for an electron in 3d orbital.

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

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

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

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

Answer: c

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2. If the kinetic energy of sa particle is reduced to half .Eebroglie wave length becomes.

A. 2 times

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

C. 4 times

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

Answer: d

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3. The number of radial nodes present in 3p orbital is

A. 0

B. 1

C. 2

D. 3

Answer: b

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4. The radiation with maximum frequency is

A. X-rays

B. Radio waves

C. UV rays

D. IR -rays

Answer: a

5. In an atoms ,the order of increasing energy of electrons with number quantum numbers.(i) n=4,1=1 (ii) n=4,1=0(ii) n=3,1=2 (iv)n=3,1=1 is

A. $iii < i < iv < ii$

B. $ii < iv < i < iii$

C. $i < iii < ii < iv$

D. $iv < ii < iii < i$

Answer: d

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6. The number of angular and radial nodes of 4d orbita l respectively are

A. 3.1

B. 1,2

C. 3,0

D. 2,1

Answer: d

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7. The oxidation state and covalency of AI on $[AICIH_2O_5]^{2+}$ ARE respectively

A. $+6, 6$

B. $+3, 6$

C. $+2, 6$

D. $+3, 3$

Answer: b

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8. The number of radial nodes of 3s and 2p orbitals respectively are

A. 0,2

B. 2,0

C. 1,2

D. 2,1

Answer: b

9. The basis of quantum mechanical model of an atom is

A. Angular momentum of electron

B. Qusntum numbers

C. Dual nature of electron

D. Black body radition

Answer: c

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10. A compound absorbs light in the wavelength region 490-500 nm. Its complementary colours is

A. Red

B. Blue

C. Orange

D. Blue-green

Answer: a

11. The quantum number which exp,ains the line spectram observed as doubled in case of

hydrogen and alkali metals and doublets and triples in case of a,kani earth metals is

A. Spin

B. Azimuthal

C. Magnetic

D. Principal

Answer: a

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12. Which one of the folowing frequencies of radiation (in Hz) has a wavelength of 600 nm?

A. 2.0×10^{13}

B. 5.0×10^{16}

C. 2.0×10^{14}

D. 5.0×10^{14}

Answer: d

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13. According to Bohr theory which one of the following values of angular momentum of hydrogen atom is not permitted ?

A. $\frac{1.25h}{\pi}$

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

C. $\frac{1.5h}{\pi}$

D. $\frac{0,5h}{\pi}$

Answer: a

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14. Which of the following transitions of an electron in hydrogen atom emits of the lowest wavelength?

A. $n_2 = \infty \text{to } n_2$

B. $n_2 = 4 \text{to} n_1 = 3$

C. $n_2 = 2 \text{to} n_1$

D. $n_2 = 5 \text{to} n_1 = 3$

Answer: c

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15. Which one of the following conditions is incorrect for a well behaved wave function ψ ?

A. ψ must be finite

B. ψ_2 must be single valued

C. ψ must be infinite

D. ψ must be continous

Answer: c

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16. The electron infinity values of elements. A.B and C are respectively $-135,-60,-200$ and $-348KJ = mol^{-1}$. The outer electronic configuration of elements B is

A. $3s^2 3p^5$

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

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

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

Answer: c

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17. The wavelength of electron waves in two orbits is $3:5$. The ratio of kinetic energy of electrons wil be

A. $25:9$

B. $5:3$

C. $9:25$

D. $3:5$

Answer: a

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18. Electrons with a kinetic energy of `6.023 xx 10^(4) J//mol are evolved from the surface of a metal, when it is exposed to radiation of wavelength of 600 nmn. The minimum amount of energy required to remove an electron from the metal atom is

A. $2.3125 \times 10^{-19} J$

B. $3 \times 10^{-19} J$

C. $6.02 \times 10^{-19} J$

D. $6.62 \times 10^{-32} J$

Answer: C

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19. An electronic transition in hydrogen atom resulta in the formation of H_2 line of hydrogen in Lynn series the energies associated with the electron in each of the electron in each of the orbits involved the transition (in kcal mol^{-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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20. Th velocities of two particle A and B are 0.05 and 0.02 ms6(-1)` respectively. The mass of B is

five times the mass of A.The ratio of their De-Broglie wavelength is

A. $2:1$

B. $1:4$

C. $1:1$

D. $4:1$

Answer: a

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21. Match the following

Column I	Column II (At STP)
(A) 10 g $CaCO_3$ $\xrightarrow[\text{Decomposition}]{\Delta}$	(1) 0.224 L CO_2
(B) 1.06 g Na_2CO_3 $\xrightarrow{\text{Excess HCl}}$	(2) 4.48 L CO_2
(C) 2.4 g C $\xrightarrow[\text{Combustion}]{\text{Excess } O_2}$	(3) 0.448 L CO_2
(D) 0.56 g CO $\xrightarrow[\text{Combustion}]{\text{Excess } O_2}$	(4) 2.24 L CO_2
	(5) 22.4 L CO_2

A. A4,B1,C2,D3

B. A5,B1,C2,D3

C. A4,B1,C3,D2

D. A1,B4,C2,D3

Answer: a

22. Assertian (A)Equal males of dfferent substance contain sme number of constituent particle.

Reason (R) Equal weight of different substance contain the same number of connstituent particle.

The correct answer is s

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

B. Both (A) and (R) are true,but (R) is not correct explanation of (A)

C. (A) is true ,but (R) is false

D. (A) is false,but (R) is true

Answer: c

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23. The wavelength of spectral line emitted by hydrogen atom in the Lyman series is $\frac{16}{15R}$ cm. What is the value of n_2?(R-Rydberg constant)

A. 2

B. 3

C. 4

D. 1

Answer: c

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24. The maximum number of sub-level, orbital and electrons in N shell of an atom are respectively

A. 4,12,32

B. 4,16.,32

C. 4,16,32

D. 4,32,64

Answer: c

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25. The uncertanities in then velocities of two particle A and B are 0.05 and $0.02ms^{-1}$ respectively.The mass of B is five times to that of A.What is the ratio of uncertainities $\left[\frac{\Delta x_A}{\Delta x_B}\right]$ in their positions?

A. 2

B. 0.25

C. 4

D. 1

Answer: a

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26. The energy of a photon is $3 \times 10^{-12} erg$ .What is its wavelength in nm? $\left(h = 6.62 \times 10^{-27} erg - s, 3 \times 10^{10} cms^{-1}\right)$

A. 662

B. 1324

C. 66.2

D. 6.62

Answer: a

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27. The atomic number of elements X,Y and Z are 19.21 and 25 respectively.The number of electrons present in the M shell of these elements follow yhe order

A. $Z > X > Y$

B. $X > Y > Z$

C. $Z > Y > X$

D. $Y > Z > X$

Answer: c

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28. An electrons is moving in Bohr's fourth orbits De-Broglie wavelength s λ.What is the circumference of the fourth orbit?

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

B. 2λ

C. 4λ

D. $\frac{4}{\lambda}$

Answer: c

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29. X grams of calcium carbonate was completely burnt in air.The weight of solid residue formet is 28g,.What is the value of X (in grams)?

A. 44

B. 200

C. 150

D. 50

Answer: d

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30. Which of the following elements has least number of e,ectrons in M shell?

A. K

B. Mn

C. Ni

D. Sc

Answer: a

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31. What is the volume (inL) of oxygen required at STP to completely convert in 1.5 moles of sulphur into sulphor dioxide?

A. 11.2

B. 22.4

C. 33.6

D. 44.8

Answer: c

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32. If the electron of a hydrogen atom is present in the first orbit. The total energy of the electrons is

A. $\frac{-e}{r}$

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

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

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

Answer: c

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33. If the wavelength of an electromagnetic radiation is 2000 A. what is its energy in ergs?

A. $9,94 \times 10^{-12}$

B. $9,94 \times 10^{-19}$

C. 4.97×10^{-12}

D. 4.97×10^{-19}

Answer: a

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34. X litre of carbon monoxide is present at mSTP. It is completely oxidised to CO_2 . Formed is 11.207 l. What is the vlue of X in litres?

A. 22.414

B. 11.207

C. 5.6035

D. 44.828

Answer: b

35. The concentration of a 100 ml solution containing xg of Na_2CO_3 (molecular wt=106) is YM.The value of X and Y are respectively

A. 2.12,0.05

B. 1.06,0.2

C. 1.06,0.1

D. 2.12,0.1

Answer: c

36. Which of the following statements are correct?

A. Rydberg's constant and wave number have same units.

B. Lyman series of hydrogen spectrum occurs in the ultravoilet region

C. The angular momentum of the electron in the ground state of hydrogen atom is equal to $\frac{h}{2\pi}$

D. The radius of first Bohr orbit of hydrogen atom is 2.116×10^{-8} cm

Answer: d

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37. The energy of an electromagnetic radiation is $19.875 \times 10^{-13} erg$. What is its wave number in cm^{-1}?

$\left(h = 6.625 \times 10^{-27} erg - s, c = 3 \times 10^{10} cms^{-1}\right)$

A. 1000

B. 10^6

C. 100

D. 10000

Answer: d

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38. Which of the following is not iso-electronic pair?

A. Mg^2, C^{4-}

B. N^3, O^{2-}

C. N^2, O^{2-}

D. F^-, Al^{3+}

Answer: c

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39. The energy of an electron present in Bohr's second orbit of hydrogen atom is

A. $-1312J\ a \rightarrow m^{-1}$

B. $-328KJmol^{-1}$

C. $-328J, mol^{-1}$

D. $-164KJ, mol^{-1}$

Answer: b

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

A. Copper

B. Chromium

C. Nickel

D. Iron

Answer: b

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41. What is the volume (in litres) of oxygen atSTP required for complete combustion of 32g of CH_4 ? (Molecular weight of CH_4.)

A. 44.8

B. 89.6

C. 22.4

D. 179.2

Answer: b

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42. What are the values of n_1 and n_2 for the $2_n d$ line in the Lyman series of hydrogen atomic spectrum?

A. 3 and 5

B. 2 and 3

C. 1 and 3

D. 2 and 4

Answer: c

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43. How many electrons are present in the M shell of an atom odf an el,ement with atomic number (z)24?

A. 5

B. 6

C. 12

D. 13

Answer: d

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44. What is the vlue (in litres) of CO_2 liberated at STP when 2.12 g of sodium carbonate (mol.wt.106) is treated with

A. 2.28 l

B. 0.448 l

C. 44.8 l

D. 22.4 l

Answer: c

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45. In ruthorford's $-164KJ, mol^{-1}$-ray scattering expirement, the alpha Bracket series in hydrogen atomic spectra, which has the highest energy?

A. Carbon black

B. BalPlatinium blacker

C. Zinc sulphide

D. Polytetrafluoro ethylene

Answer: c

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46. Among the first lines of Lyman,Balmer, paschen and Brackett series in hydrogen atomic spectra,which has the highest energy?

A. Lyman

B. Balmer

C. Paschen

D. Brackett

Answer: a

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47. How many moles of potassium chlorateshould be decomposed completely to obtain 67.2 L of oxygen at NTP?

A. 3

B. 4

C. 1

D. 2

Answer: d

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48. The electronic cnfiguration of sodium is

A. $[Ne]3s^2$

B. $[Ne]3s^1$

C. $[Ar]4s^1$

D. $[Ar]4s^2$

Answer: b

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49. Which one of the following sets of the quantum numbers is not possible for a 4p electron?

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

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

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

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

Answer: c

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50. How many litres of _ 2 at STP will be formed when 100 ml of 0.1 M,$H_2S)_4$ reacts with excess of Na_2CO_3 ?

A. 22.4

B. 2.24

C. 0.224

D. 5.6

Answer: c

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51. Be^{2+} is iso-electronic with

A. Mg^{2+}

B. Na^+

C. Li^+

D. H^+

Answer: c

52. The first emision line of hydrogen atomic spectrum in the Balmer series appear at(R=Rydberg constant)

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

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

C. $\frac{7R}{36}cm^{-1}$

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

Answer: a

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53. in the Bohr hydrogen atom, the electronic transition emmiting light of longest wavelength is

A. $n = 2$ to$n = 3$

B. $n = 4$ to $n = 3$

C. $n = 3$ to $n = 2$

D. $n = 2$to$n = 1$

Answer: b

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54. The De-Broglie wavelenth of a particle with mass 1 g and velocity $100ms^{-1}$ is

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

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

C. $6.625 \times 10^{-33} m$

D. $6.63 \times 10^{-32} m$

Answer: c

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55. The De-Broglie wavelength associated with a particle of mass 1 mg moving with a velocity of $10 ms^{-1}$ is

A. $6.63 \times 10^{-29} m$

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

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

D. $6.63 \times 10^{-22} m$

Answer: a

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56. The rule that explain the reason for chromium to have $[Ar]3d^5 4s^1$ configuration instead of $[Ar]3d^4, 4s^2$ is

A. Pauli's ecclusion priciple

B. Aufbau priciple

C. Hund's rule

D. Heisenburg's priciple

Answer: c

57. The volume in litres of CO_2 librated at STP when 10 g of 90% pure limestone is heated completely,is

A. 2.016

B. 20.16

C. 2.24

D. 22.24

Answer: a

58. Ruthford's expirement on scatterinf of α-particle showed for the first time that the atom has

A. Nucleus

B. Electron

C. Proton

D. Neutron

Answer: a

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59. The radius of the second Bohr orbit is

A. 0.053 nm

B. 0.106 nm

C. 0.212 nm

D. 0,0265 nm

Answer: c

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60. The formula of a metal chloride is MCl_3 and it contains 20% of the metal.The atomic weight of the metal is approxiamately

A. 26.5

B. 11.8

C. 21.3

D. 106.5

Answer: a

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61. Which one of the following gases contains the least number of molecules ?

A. 4.0 laughing gas

B. 3.0 phosphurus

C. 2.0 g marsh gas

D. 10.0g phosgene

Answer: a

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62. The constancy of $\frac{e}{m}$ ratio for electrons insdpite of variation of gas present in the

discharge tube or of the matrial of the cathode shows that

A. Electrons are negatively charged

B. Electron are universal constituents of matter

C. Electrons are the lightest of all particle

D. Mass of the electron is $\frac{1}{1838}$ of the mass H-atom

Answer: b

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63. The basic assumption of Bohr's model of hydrogen atom is that

A. The energy of the electron is quantised

B. The angular momentum of the electron is quantied

C. The radial distance of the electron is quantised

D. The orbital velocity of the electron is quantised

Answer: b

64. According to Aufbau principle,the sub-shell which is occupied by the electron first has

A. Higher energy

B. Lower stability

C. Lower energy

D. Can't be predicted

Answer: c

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65. 0.84g of metal carbonate reacts exactly with 40 ml of $N/2H_2SO_4$. The equivelent weight of the metal carbonate is

A. 84g

B. 64g

C. 42g

D. 38g

Answer: c

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66. The number of molecules present in 3.5 g of CO at $0^\circ c$ and 760 nm pressure is

A. 6.02×10^{23}

B. $1.25 \times 6.02 \times 10^{23}$

C. $0.125 \times 6.02 \times 10^{23}$

D. $1.25 N_A$

Answer: c

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67. Which of the gases contains the same number of molecules as that of 16 g oxygen?

A. $16gof o_3$

B. $32gofSO_2$

C. $16gofSO_2$

D. All of these

Answer: b

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68. When 4p orbital in any atom is filled completely,the next electron goes in

A. 5s

B. 3d

C. 4d

D. 4f

Answer: a

69. Which one of the following series of line is found in the UV region of atomic spectrum of hydrogen

A. Balmer

B. Paschen

C. Brackett

D. Lyman

Answer: d

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70. The energy of the electron in the hydrogen atom is given by the expression

A. $\frac{-e^2}{r^2}$

B. $\frac{-n^2h^2}{2\pi Z^2e^4m}$

C. $\frac{-2\pi^2Z^2e^4}{n^2h^2}$

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

Answer: c

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71. One atom of $^{39}_{19}K$ contains

A. $19p$, $20n$ and $19e^-$

B. $19p$, $20n$ and $20e^-$

C. $20p$, $19n$ and $20e^-$

D. $20p$, $19n$ and $19e^-$

Answer: a

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72. Whwn the electron in an excited hydrogen atom jumps from an energy level for which $n = 5$ to level for which $n = 2$,the spectral line is obeserved in which series of the hydrogen spectrum?

A. Lyman

B. Balmer

C. Paschen

D. Brackket

Answer: b

73. The number of moles of barium carbonate which contains 1.5 moles of oxygen atom is

A. 1.5

B. 1

C. 2

D. 0.5

Answer: d

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74. The maximum number of electrons that can be accommodated in all the orbitals for which $l = 3$. Is

A. 15

B. 14

C. 10

D. 6

Answer: b

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75. The magnetic quantum number m for the outermost electron in the Na atom,is

A. 1

B. 2

C. 3

D. 0

Answer: d