CHEMISTRY

BOOKS - NEET PREVIOUS YEAR

(YEARWISE + CHAPTERWISE)

ATOMIC STRUCTURE

Mcq

1. Which one is the wrong statement ?

A. de-Broglie's wavelength is given by

$$\lambda = \frac{h}{mv},$$

where

m = mass of the particle,

v = group velocity of the particle

B. The uncertainty principle is

$$\Delta E \times \Delta t \geq h/4\pi$$

C. Half-filled and fully filled orbitals have greater stability due to greater

exchange energy, greater symmetry and more balanced arrangement

D. The energy of 2s-orbital is less than the energy of 2 p-orbital in case of hydrogen like atoms

Answer: D

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

A. Magnetic quantum number

B. Azimuthal quantum number

C. Spin quantum number

D. Principal quantum number

Answer: C

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3. How many delectrons can fit in the orbital for which n = 3 and l = 1?

A. 2

B. 6

C. 10

D. 14

Answer: A

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4. Which is the correct order of increasing energy of the listed orbitals in the atom of titanium ?

A. 3s 4s 3p 3d

B. 4s 3s 3p 3d

C. 3s 3p 3d 4s

D. 3s 3p 4s 3d

Answer: C

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5. The number of d-electrons in Fe^{2+} (Z=26) is not equal to the number of electrons in which one of the following ?

A. s-electrons in Mg (Z=12)

B. p-electrons in Cl (Z=17)

C. d-electrons in Fe (Z=26)

D. p-electrons in Ne (Z=10)

Answer: B

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6. The angular momentum of electrons in d orbital is equal to

A. $\sqrt{6}h$

B. $\sqrt{2}h$

C. $2\sqrt{3}h$

D. 0 h

Answer: A

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7. What is the maximum number of orbitals that can be identified with the following quantum numbers ? $n = 3, l = 1, m_l = 0.$

A. 1

B. 2

C. 3

D. 4

Answer: A

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8. Calculate the energy in joule corresponding to light of wavelength $45nm$:

(Planck' constant $h = 6.63 \times 10^{-34} Js$, speed of light $c = 3 \times 10^{8} ms^{-1}$)

A. 6.67×10^{15}

B. 6.67×10^{11}

C. 4.42×10^{-15}

D. 4.42×10^{-18}

Answer: D

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9. The value of Planck's constant is $6.63 \times 10^{-34} Js$. The speed of light is $3 \times 10^{17} nms^{-1}$. Which value is the closed to the wavelength in nanometers of a quantum of light with frequency $6 \times 10^{10} s^{-1}$?

A. 10

B. 25

C. 50

D. 75

Answer: C

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10. What is the maximum number of electrons that can be associated with a following set of quantum numbers ? $(n = 3, l = 1 \text{ and } m = -1).$

A. 10

B. 6

C. 4

D. 2

Answer: D

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11. Maximum number of electrons in a sub-shell with $l = 3$ and $n = 4$ is.

A. 14

B. 16

C. 10

D. 12

Answer: A

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

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

B. $6, 0, 0, +\frac{1}{2}$

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

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

Answer: C

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

A. $\lambda_1 = 2\lambda_2$

B. $\lambda_1 = 4\lambda_2$

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

D. $\lambda_1 = \lambda_2$

Answer: A

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14. If $n = 6$, the correct sequence for filling of electrons will be.

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

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

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

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

Answer: D

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15. Which of the following is not permissible arrangement of electrons in an atom ?

A. n=4, l=0, m=0, s=-1/2

B. n=5, l=3, m=0, s=+1/2

C. n=3, l=2, m=-3, s=-1/2

D. n=3, l=2, m=-2, s=-1/2

Answer: C

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16. The energy absorbed by each molecule (A_2) of a substance is $4.4 \times 10^{-19} J$ and bond energy per molecule is $4.0 \times 10^{-19} J$. The

kinetic energy of the molecule per atom will be.

A. $2.0 \times 10^{-20} J$

B. $2.2 \times 10^{-19} J$

C. $2.0 \times 10^{-19} J$

D. $4.0 \times 10^{-20} J$

Answer: A

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17. Maximum number of electrons in a sub-shell of an atom is determined by the following.

A. 4l +2

B. 2l +1

C. 4l -2

D. $2n^2$

Answer: A

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18. The measurement of the electron position is associated with an uncertainty in momentum, which is equal to $1 \times 10^{-18} gcms^{-1}$. The uncertainty in electron velocity is (mass of an electron is $9 \times 10^{-28} g$)

A. 1×10^{9} cm s^{-1}

B. 1×10^{6} cm s^{-1}

C. 1×10^{5} cm s^{-1}

D. 1×10^{11} cm s^{-1}

Answer: A

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19. If uncertainty in position and momentum are equal then uncertainty in velocity is.

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

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

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

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

Answer: A

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20. Consider the following sets of quantum numbers.

(i)

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

(ii)

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

(iii)

n	l	m	s
4	3	-2	$-1/2$

(iv)

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

(v)

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

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

A. (ii), (iii) and (iv)

B. (i), (ii), (iii) and (iv)

C. (ii), (iv) and (v)

D. (i) and (iii)

Answer: D

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21. The orientation of an atomic orbital is governed by :

A. azimuthal quantum number

B. spin quantum number

C. magnetic quantum number

D. Principal quantum number

Answer: C

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22. Given $m_e = 9.11 \times 10^{-31} kg$ and $h = 6.626 \times 10^{-34} Js$, the uncertainty

involved in the measuremenetof velocity within a distance of 0.1Å is

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

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

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

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

Answer: A

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

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

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

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

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

Answer: D

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24. The frequency of radiations emitted when electron falls from $n = 4$ to $n = 1$ in $H - \text{atom}$ would be (Given E_1 for $H = 2.18 \times 10^{-18} J\text{atom}^{-1}$ and $h = 6.625 \times 10^{-34} Js$.)

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

B. $1.03 \times 10^{15} s^{-1}$

C. $3.08 \times 10^{15} s^{-1}$

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

Answer: C

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

A. 4×10^{1}

B. 3×10^{7}

C. 2×10^{-25}

D. 5×10^{-18}

Answer: A

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

A. $+3.4eV$

B. $+6.8eV$

C. $-13.6eV$

D. $+13.6eV$

Answer: A

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27. The following quantum numbers are possible for how many orbitals $(s)n = 3, l = 2, m = +2$?

A. 1

B. 2

C. 3

D. 4

Answer: A

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

A. 6.56 nm

B. 65.6 nm

C. 656 nm

D. 0.656 nm

Answer: C

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

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

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

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

D. $6.65 \times 10^{-36} m$

Answer: A

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

A. Hund

B. Thomson

C. Rutherford

D. Sommerfeld

Answer: D

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

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

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

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

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

Answer: D

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32. The uncertainty in momentum of an electron is $1 \times 10^{-5} kg - m/s$. The

uncertainty in its position will be $\left(h = 6.62 \times 10^{-34} kg = m^2/s\right).$

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

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

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

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

Answer: C

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33. The position of both an electron and a helium atom is known within $1.0nm$ and the momentum of the electron is known within $50 \times 10^{-26} kgms^{-1}$. The minimum uncertainty in the measurement of the momentum of the helium atom is.

A. $50kgms^{-1}$

B. $80kgms^{-1}$

C. $80 \times 10^{-26} kgms^{-1}$

D. $5.0 \times 10^{-26} kgms^{-1}$

Answer: D

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

A. 0.13

B. 0.06

C. 4.77

D. 2.12

Answer: D

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35. The electronic configuration of gadolinium (Atomic number 64) is

A. [Xe] $4f^8, 5d^9, 6s^2$

B. [Xe] $4f^7, 5d^1, 6s^2$

C. [Xe] $4f^6, 5d^2, 6s^2$

D. [Xe] $4f^3, 5d^5, 6s^2$

Answer: B

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36. The momentum of a particle having a de-Broglie wavelength of 10^{17} m is (Given, $h = 6.625 \times 10^{-34} m$)

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

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

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

D. $13.25 \times 10^{-17} kgms^{-1}$

Answer: C

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37. The orbitals are called degenerate when

A. they have the same wave functions

B. they have the same wave functions but different energies

C. they have different wave functions but same energy

D. they have the same energy

Answer: D

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38. 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 $0.001\ \%$ will be

(Use $\frac{h}{4\pi}$ in the uncertainty expression, where $h = 6.626 \times 10^{-27} erg - s$)

A. 1.93 cm

B. 3.84 cm

C. 5.76 cm

D. 7.68 cm

Answer: A

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

A. 0.17 Å

B. 0.53 Å

C. 0.265 Å

D. 1.06 Å

Answer: A

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

A. d-orbital

B. f-orbital

C. p-orbital

D. s-orbital

Answer: D

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41. In photoelectric emission, the energy of the emitted electron is

A. greater than the incident photon

B. same as that of the incident photon

C. smaller than the incident photon

D. proportional to the intensity of incident photon

Answer: C

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

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

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

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

D. $\frac{mv^2}{r}$

Answer: B

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43. The wave character of moving electron was experimentally verified by :

A. de-Broglie

B. N Bohr

C. Davisson and Germer

D. Schrodinger

Answer: C

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44. Which of the following is/are false regarding cathode rays?

A. They possess kinetic energy

B. They are electromagnetic waves

C. They produce heat

D. They produce mechanical pressure

Answer: B

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

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	1	0	$-\frac{1}{2}$

D.

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

Answer: B

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46. The ionization potential for hydrogen atom is $13.6eV$, the ionization potential for He^+ is

A. 54.4 eV

B. 6.8 eV

C. 13.6 eV

D. 24.5 eV

Answer: A

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47. The energy of an electron in the nth Bohr orbit of hydrogen atom is

A. $-\frac{13.6}{n^4}$ eV

B. $-\frac{13.6}{n^3}$ eV

C. $-\frac{13.6}{n^2}$ eV

D. $-\frac{13.6}{n}$ eV

Answer: C

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48. Electronic configuration calcium atom can be written as

A. [Ne] $4p^2$

B. [Ar] $4s^2$

C. [Ne]$4s^2$

D. [Kr]$4p^2$

Answer: B

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

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

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

C. $1s^2, 2s^2 2p^6, 3s^2 3p^6, 4s^2 4p^6, 5s^2 5p^1$

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

Answer: B

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50. For azimuthal quantum number l=3, the maximum number of electrons will be

A. 2

B. 6

C. 0

D. 14

Answer: D

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51. FILLING OF ATOMIC ORBITALS- AUFBAU PRINCIPLE

A. 3d, 4s, 4p, 4d, 5s

B. 4s, 3d, 4p, 5s, 4d

C. 5s, 4p, 3d, 4d, 5s

D. 3d, 4p, 4s, 4d, 5s

Answer: B

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

A. Hund's rule

B. Aufbau principle

C. Uncertainty principle

D. Pauli's exclusion principle

Answer: D

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53. An ion has 18 electrons in the outermost shell it is

A. Cu^+

B. Th^{4+}

C. Cs^+

D. K^+

Answer: A

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54. The total number of electrons that can be accommodated in all the orbitals having principal quantum number 2 and azimuthal quantum number 1 are

A. 2

B. 4

C. 6

D. 8

Answer: C

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

A. 4l -2

B. 4l +2

C. 2l +2

D. $2n^2$

Answer: B

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56. Number of unpaired electrons in N^{2+} is/are

A. 2

B. 0

C. 1

D. 3

Answer: C

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

A. Energy of the electrons in the orbits are quantised

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

C. Electrons revolve in different orbits around the nucleus

D. The position and velocity of electrons in the orbit cannot be determined simultaneously

Answer: D

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

A. rn^2

B. rn

C. $\frac{r}{n}$

D. r^2n^2

Answer: A

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59. The number of spherical nodes in $3p$ orbital are

A. one

B. three

C. two

D. None of these

Answer: A

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

A. H

B. Na

C. Li^+

D. He^+

Answer: C

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