QB365 Question Bank Software Study Materials

Quantum Mechanical Model of Atom 50 Important 1 Marks Questions With Answers (Book Back and Creative)

11th Standard

Chemistry

Total Marks : 50

Multiple Choice Question

50 x 1 = 50

1) The energy of light of wavelength 45 nm is _____.

(a) 6.67 x 10^{15}J (b) 6.67 x 10^{11}J **(c) 4.42 x 10^{-18}J** (d) 4.42 x 10^{-15}J

2) The energies $E_1$and E_2 of two radiations are 25 eV and 50 eV respectively. The relation between their wavelengths ie λ_1 andλ_2 will be _____

(a) $\frac{\lambda_1}{\lambda_2} = 1$ **(b)** $\lambda_1 = 2\lambda_2$ (c) $\lambda_1 = \sqrt{25 \times 50\lambda_2}$ (d) $2\lambda_1 = \lambda_2$

3) Splitting of spectral lines in an electric field is called _____

(a) Zeeman effect (b) Shielding effect (c) Compton effect **(d) Stark effect**

4) According to the Bohr Theory, which of the following transitions in the hydrogen atom will give rise to the least energetic photon?

(a) n = 6 to n = 1 (b) n = 5 to n = 4 (c) n = 5 to n = 3 **(d) n = 6 to n = 5**

5) Which of the following pairs of d-orbitals will have electron density along the axes ?

(a) d_z2, d_{xz} (b) d_{xz}, d_{yZ} **(c) d_z2, $d_{x^2-y^2}$** (d) d_{xy} ,$d_{x^2-y^2}$

6) The electronic configuration of Eu (Atomic no. 63) Gd (Atomic no. 64) and Tb (Atomic no. 65) are _____

(a) [Xe] $4f^6$ $5d^1$ $6s^2$, [Xe] $4f^7$ Sd^1 $6s^2$ and [Xe] $4f^8$ $5d^1$ $6s^2$ **(b) [Xe] $4f^7$, $6s^2$, [Xe] $4f^7$ $5d^1$ $6s^2$ and [Xe] $4f^9$ $6s^2$**

(c) [Xe] $4f^7$,$6s^2$, [Xe] $4f^8$ $6s^2$ and [Xe] $4f^8$ $5d^1$ $6s^2$ (d) [Xe] $4f^6$ $5d^1$ $6s^2$, [Xe] $4f^7$ $5d^1$ $6s^2$ and [Xe] $4f^9$ $6s^2$

7) Based on equation E = $-2.178 \times 10^{-18} J \left(\frac{Z^2}{n^2}\right)$certain conclusions are written. Which of them is not correct?

(a) Equation can be used to calculate the change in energy when the electron changes orbit

(b) For n = 1, the electron has a more negative energy than it does for n = 6 which means that the electron is more loosely bound in the smallest allowed orbit

(c) The negative sign in equation simply means that the energy of electron bound to the nucleus is lower than it would be if the electrons were at the infinite distance from the nucleus.

(d) Larger the value of n, the larger is the orbit radius.

8) Two electrons occupying the same orbital are distinguished by _____

(a) azimuthal quantum number **(b) spin quantum number** (c) magnetic quantum number

(d) orbital quantum number

9) The maximum number of electrons in a sub shell is given by the expression _____

(a) $2n^2$ (b) 2l + 1 **(c) 4l + 2** (d) none of these

10) For d-electron, the orbital angular momentum is _____

(a) $\frac{\sqrt{2}h}{2\pi}$ (b) $\frac{\sqrt{2h}}{2\pi}$ (c) $\frac{\sqrt{2\times4}h}{2\pi}$ **(d)** $\frac{\sqrt{6}h}{2\pi}$

11) What is the maximum numbers of electrons that can be associated with the following set of quantum numbers? n = 3, I = 1 and m =-1

(a) 4 (b) 6 **(c) 2** (d) = 10

12) The total number of orbitals associated with the principal quantum number n = 3 is _____

(a) 9 (b) 8 (c) 5 (d) 7

13) If n = 6, the correct sequence for filling of electrons will be _____

(a) ns → (n-2)f → (n - 1)d → np (b) ns → (n - 1) d → (n - 2) f → np (c) ns → (n-2)f →np → (n-1)d

(d) none of these are correct

14) Consider the following sets of quantum numbers:

	n	l	m	s
(i)	3	0	0	$+\frac{1}{2}$
(ii)	2	2	1	$-\frac{1}{2}$
(iii)	4	3	-2	$+\frac{1}{2}$
(iv)	1	0	-1	$+\frac{1}{2}$
(v)	3	4	3	$-\frac{1}{2}$

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

(a) (i), (ii), (iii) and (iv) **(b) (ii), (iv) and (v)** (c) (i) and (iii) . (d) (ii), (iii) and (iv)

15) How many electrons in an atom with atomic number 105 can have (n + 1) = 8 ?

(a) 30 **(b) 17** (c) 15 (d) unpredictable

16) Electron density in the yz plane of $3d_{xy}$ orbital is _____

(a) zero (b) 0.50 (c) 0.75 (d) 0.90

17) If uncertainty in position and momentum are equal, then minimum uncertainty in velocity is _____

(a) $\frac{1}{m}\sqrt{\frac{h}{\pi}}$ (b) $\sqrt{\frac{h}{\pi}}$ **(c)** $\frac{1}{2m}\sqrt{\frac{h}{\pi}}$ (d) $\frac{h}{4\pi}$

18) A macroscopic particle of mass 100 g and moving at a velocity of 100 cm S^{-1} will have a de Broglie wavelength of _____

(a) 6.6×10^{-29} cm (b) 6.6×10^{-30} cm **(c) 6.6×10^{-31} cm** (d) 6.6×10^{-32} cm

19) The ratio of de Broglie wavelengths of a deuterium atom to that of an α - particle, when the velocity of the former is five times greater than that of later, is _____

(a) 4 (b) 0.2 (c) 2.5 **(d) 0.4**

20) The energy of an electron in the 3rd orbit of hydrogen atom is -E. The energy of an electron in the first orbit will be _____

(a) -3E (b) $\frac{-E}{3}$ (c) $\frac{-E}{9}$ **(d) -9E**

21) Time independent Schnodinger wave equation is _____

(a) $\hat{H}\psi = E\psi$ (b) $\nabla^2\psi + \frac{8\pi^2 m}{h^2}(E+V)\psi = 0$ (c) $\frac{\partial^2\psi}{\partial x^2} + \frac{\partial^2\psi}{\partial y^2} + \frac{\partial^2\psi}{\partial z^2} + \frac{2m}{h^2}(E-V)\Psi = 0$ (d) All of these

22) Which of the following does not represent the mathematical expression for the Heisenberg uncertainty principle?

(a) $\triangle x.\triangle p \geq \frac{h}{4\pi}$ (b) $\triangle x.\triangle v \geq \frac{h}{4\pi m}$ (c) $\triangle E.\triangle t \geq \frac{h}{4\pi}$ **(d)** $\triangle E.\triangle x \geq \frac{h}{4\pi}$

23) Assertion: The spectrum of He^+ is expected to be similar to that of hydrogen

Reason: He^+ is also one electron system.

(a) If both assertion and reason are true and reason is the correct explanation of assertion.

(b) If both assertion and reason are reason are true but reason is not the correct explanation of assertion

(c) If assertion is true but reason is false (d) If both assertion and reason are false

24) Assertion: Number of radial and angular nodes for 3p orbital are 1, 1 respectively.

Reason: Number of radial and angular nodes depends only on principal quantum number.

(a) both assertion and reason are true and reason is the correct explanation of assertion.

(b) both assertion and reason are true but reason is not the correct explanation of assertion.

(c) assertion is true but reason is false (d) both assertion and reason are false

25) Electronic configuration of species M^{2+} is $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 3d^6$ and its atomic weight is 56. The number of neutrons in the nucleus of species M is _____

(a) 26 (b) 22 **(c) 30** (d) 24

26) How many nodes are possible for 2s orbital?

(a) 1 (b) 2 (c) 3 (d) zero

27) Which of the following configuration is correct for iron?

(a) $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^7$ (b) $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^6$ (c) $1s^2 2s^2 2p^6 3s^2 3p^6 3d^7$ **(d) $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^7$**

28) Maximum number of electrons in a subshell with l = 3 and n = 4 is _____

(a) 10 (b) 12 **(c) 14** (d) 16

29) The radius of nucleus is approximately _____ times smaller than the radius of atom.

(a) 1,00,000 (b) 5,000 (c) 10,000 (d) 200

30) The number of neutron(s) present in deuterium is _____

(a) 0 **(b) 1** (c) 2 (d) 3

31) If E_n = -313.6/n2,If the value of E_i = -34.84 to which value 'n' corresponds _____

(a) 4 **(b) 3** (c) 2 (d) 1

32) Dual character of an electron was explained by _____

(a) Bohr (b) Heisenberg **(c) de-Broglie** (d) Pauli

33) Bohr's equation for energy of an election in a hydrogen atom is given as_____

(a) $E = \frac{-1312}{n^2} KJmol^{-1}$ (b) $E = \frac{-1312}{n^2 h^2} KJmol^{-1}$ (c) E = hv (d) $E = \frac{4\pi^2 me^4}{n^2 h^2} KJmol^{-1}$

34) When an electron jumps from lower orbit to higher orbit _____

(a) energy is released **(b) energy is absorbed** (c) no change in energy (d) it radiates energy

35) The de-Broglie wavelength of a particle with mass 19 and velocity 100 m/s is _____

(a) 6.63×10^{-35} m (b) 6.63×10^{-34} m **(c) 6.63×10^{-33} m** (d) 6.65×10^{-35} m

36) If the de Broglie wavelength of a particle of mass (m) is 100 times its velocity, then its value in terms of its mass (m) and Planck's constant (h) is _____

(a) $\frac{1}{10}\sqrt{\frac{m}{h}}$ **(b)** $10\sqrt{\frac{h}{m}}$ (c) $\frac{1}{10}\sqrt{\frac{h}{m}}$ (d) $10\sqrt{\frac{m}{h}}$

37) What is the maximum number of electrons that can be associated with the following set of quantum numbers? n = 3, l = 2, m = + 2.

(a) 1 **(b) 2** (c) 3 (d) 4

38) Which of the following experiment proves the presence of an electron in an atom?

(a) Rutherford's α-ray scattering experiment (b) Davisson and Germer experiment

(c) J. J. Thomson cathode ray experiment (d) G.P. Thomson gold foil experiment

39) de Broglie equation is_____

(a) E = $h\gamma$ (b) $E = mc^2$ (c) $\gamma = \frac{E_2 - E_1}{h}$ **(d)** $\lambda = \frac{h}{mv}$

40) Which one of the following is the time independent Schrodinger wave equation?

(a) $\triangle x . \triangle p \geq \frac{h}{4\pi}$ (b) $\frac{\partial^2\psi}{\partial x^2} + \frac{\partial^2\psi}{\partial y^2} + \frac{\partial^2\psi}{\partial z^2} + \frac{8\pi^2 m}{h^2} = 0$ **(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) $\hat{H}\psi - E\psi = -\frac{8\pi^2 m}{h^2}$

41) de Broglie equation is_____.

(a) $\lambda = \frac{h}{mv}$ (b) $\lambda = \frac{hv}{m}$ (c) $\lambda = \frac{mv}{h}$ (d) $\lambda = hmv$

42) Among the following the one is different from other is _____

(a) d_{xy} (b) d_{yz} **(c)** $\mathbf{d_{x^2-y^2}}$ (d) d_{zx}

43) The radius of the atom is of the order of _____.

(a) 10^{-10}m (b) 10^{-13}cm (c) 10^{-15}kg **(d)** $\mathbf{10^{-8}cm}$

44) Rutherford's α - ray scattering experiment showed for the first time that the atom has _____.

(a) Nucleus (b) Proton (c) Electron (d) Neutron

45) According to Bohr's theory the angular momentum of electron in 5^{th} orbit is _____.

(a) 2.5 h/π (b) 25 h/π (c) 1.0 h/π (d) 10 h/π

46) The expression for radius of a Bohr's orbit in H - atom is _____.

(a) $\frac{\mathrm{nh}}{2\pi\mathrm{mr}}$ **(b)** $\frac{n^2h^2}{4\pi^2me^2}$ (c) $\frac{-2\pi^2me^4}{n^2h^2}$ (d) $\frac{\mathrm{n}^2}{4\pi^2\mathrm{mhe}^2}$

47) The de - Broglie's equation treats an electron as _____.

(a) A particle (b) A wave (c) Ray **(d) Both (a) & (c)**

48) In Davisson & Germer experiment, which crystal is used in the diffraction pattern?

(a) ZnS **(b) Ni** (c) NaC (d) CsC

49) The number of sublevel in the quantum level n = 3 is _____.

(a) 1 (b) 2 **(c) 3** (d) 4

50) An orbital angular momentum is calculated using the expression _____.

(a) $\sqrt{l(l+1)}\mathrm{h}/4\pi$ (b) $\sqrt{l(l+1)}\mathrm{h}^2/4\pi^2$ (c) $\sqrt{l(l+1)}\mathrm{h}/2\pi$ **(d)** $l(l+1)^{\mathrm{h}}/2\pi$