ATOMIC STRUCTURE

1	The difference between n^{th} and $(n+1)^{th}$ Bohr's radius of H atom is equal to its $(n-1)^{th}$ Bohr's radius. The value of n is :- (1) 1 (2) 2 (3) 3 (4) 4
2	**The increasing order of specific charge of electron (e), proton (p), alpha particle (α) and neutron (n) is** 1) e, p, n, α 2) n, p, e, α 3) n, α, p, e 4) n, p, α, e
3	**In photo electric effect, the energy photon striking a metallic surface is $5.6\times10^{-19}J$. The kinetic energy of the ejected electrons is $12.0\times10^{-20}J$. The work function is** 1) $6.4\times10^{-19}J$ 2) $6.8\times10^{-19}J$ 3) $4.4\times10^{-19}J$ 4) $6.4\times10^{-20}J$
4	**The ratio of highest possible wavelength to lowest possible wavelength of Lyman series is** 1) 4/3 2) 9/8 3) 27/5 4) 16/5
5	**What is the lowest energy of the spectral line emitted by the hydrogen atom in the Lyman series? (h= Planck's constant; C= Velocity of light; R= Rydberg constant).** 1) $\frac{5hcR}{36}$ 2) $\frac{4hcR}{3}$ 3) $\frac{3hcR}{4}$ 4) $\frac{7hcR}{144}$
6	**The change in velocity when hydrogen electron jumps from K shell to L shell is** 1) One-half of its original velocity 2) Twice to its original velocity 3) One-quarter of its original velocity 4) Equal to its original velocity
7	**If the wavelength of the electron is numerically equal to the distance travelled by it in 1 sec, then** 1) $\lambda=\frac{h}{p}$ 2) $\lambda=\sqrt{\frac{h}{m}}$ 3) $\lambda=\frac{h}{m}$ 4) $\lambda=\sqrt{\frac{h}{p}}$
8	**When uncertainty in position and momentum are equal, then uncertainty in velocity is :** 1) $\sqrt{\frac{h}{\pi}}$ 2) $\frac{1}{2}\sqrt{\frac{h}{\pi}}$ 3) $\frac{1}{2m}\sqrt{\frac{h}{\pi}}$ 4) $2m\sqrt{\frac{h}{\pi}}$
9	**The velocities of two particles A and B are 0.05 and 0.02m/s respectively. The mass of B is five times the mass of A. The ratio of their de-Broglies wavelength is** 1) 2 : 1 2) 1 : 4 3) 1 : 1 4) 4 : 1
10	**A ball of mass 200 gm is moving with velocity of 10 $m.s^{-1}$. If the error in measurement of velocity is 0.1%, the uncertainity in its position is** 1) $3.3.x\ 10^{-31}$ m 2) $3.3\ x\ 10^{-27}$ m 3) $5.3\ x\ 10^{-25}$ m 4) $2.64\ x\ 10^{-32}$ m

11 **Consider the following statements :**

1) Electron density in XY plane in $3d_{x^2-y^2}$ orbital is zero

2) Electron density in XY plane in $3d_z^2$ orbital is zero

3) 2s orbital has only one spherical node

4) For $2p_z$ orbital YZ is the nodal plane

The correct statements are :

1) 2 and 3 2) 1,2,3,4 3) Only 2 4) 1 & 3

12 **The minimum angular momentum of an electron with the magnetic quantum numbers –1, 0, +1**

1) $\sqrt{\frac{3}{2}\frac{h}{\pi}}$ 2) $\frac{h}{\pi}$ 3) $\frac{2h}{\pi}$ 4) $\frac{3}{2}\frac{h}{\pi}$

13 **The spin magnetic momentum of electrons in an ion is 4.84 BM. Its total spin will be**

1) ± 1 2) ± 2 3) $\geq \sqrt{\frac{h}{4\pi}}$ 4) ± 2.5

14 **The mass numbers of three isotopes of an element are 10,12,14 units.Thier percentage abundance is 80,15, and5 respectively.What is the atomic weight of the element?**

1)10.5 2)11.5 3)12.5 4)13.5

15 **A quantum of light having energy E has wavelength equal to $7200A^0$. The frequency of light which corresponds to energy equal to 3E, is**

1) $1.25\times10^{14}s^{-1}$ 2) $1.25\times10^{15}s^{-1}$ 3) $1.25\times10^{13}s^{-1}$ 4) $1.25\times10^{14}s^{-1}$

16 **When a metal is irradiated with light of frequency $4.0\times10^{16}s^{-1}$ the photo electrons emitted had six times the K.E as the K.E of photo electron emitted when the metal was irradiated with light of frequency $2.0\times10^{16}s^{-1}$. The calculate the critical frequency of the metal.**

1) $2.0\times10^{16}s^{-1}$ 2) $1.6\times10^{16}s^{-1}$ 3) $3.0\times10^{16}s^{-1}$ 4) $4.2\times10^{16}s^{-1}$

17 **In photo electric effect,if the energy required to over come the attractive forces on the electron(work function) of *Li*, *Na* and *Rb* are 2.41eV, 2.3eV and 2.09eV respectively, the work function of "*K*" could approximately be in eV**

1) 2.52 2) 2.2 3) 2.35 4) 2.01

18 **A photon of wavelength $4\times10^{-7}m$ strikes on metal surface, The work function of the metal is $2.13eV$. The velocity of the photo electron is**

1) $5.67\times10^{6}ms^{-1}$ 2) $5.67\times10^{5}ms^{-1}$ 3) $5.67\times10^{-5}ms^{-1}$ 4) $5.67\times10^{-6}ms^{-1}$

19 **Threshold frequency of metal is f_0.When light of frequency $\upsilon = 2f_0$ is incident on the metal plate, velocity of electron emitted in V_1. When a plate frequency of incident radiation is $5f_0$, V_2 is velocity of emitted electron , then $V_1:V_2$ is**

1)1:4 2) 1:2 3) 2:1 4) 4:1

20 **Calculate the energy emitted when electrons of 1.0 gram atom of hydrogen undergo transition giving the spectral line of lowest wave energy in the visible region of its atomic spectrum.**

1) $n_2 = 3$ to $n_1 = 2$; E = 182.8 KJ 2) $n_2 = 2$ to $n_1 = 1$; E = 155.8 KJ

3) $n_2 = 3$ to $n_1 = 1$; E = 180.8 KJ 4) $n_2 = 4$ to $n_1 = 2$; E = 182.5 KJ

21 **The energy difference between the states of n = 2 and n = 3 is 'E' eV in Hydrogen atom. The ionization potential of H atom is**

1) 3.2 E 2) 7.2 E 3) 5.6 E 4)13.2 E

22	**Which of the following relationship is correct?** 1) E_1 of $H = \frac{1}{2}E_2$ of $He^+ = \frac{1}{3}E_3$ of $Li^{+2} = \frac{1}{4}$ of E_4 of Be^{+3} 2) E_1 of $H = E_2$ of $He^+ = E_3$ of $Li^{+2} = E_4$ of Be^{+3} 3) E_1 of $H = 2E_2$ of $He^+ = 3E_3$ of $Li^{+2} = 4E_4$ of Be^{+3} 4) E_1 of $H = \frac{2}{3}E_2$ of $He^+ = \frac{4}{3}E_3$ of $Li^{+2} = \frac{5}{4}E_4$ of Be^{+3}
23	**What is the wavelength of a photon emitted during a transition from n = 5 state to the $n = 2$ state in the hydrogen atom** 1) 434nm 2) 234nm 3) 476nm 4) 244nm
24	**What is likely to be principal quantum number for a circular orbit of diameter 20.6 nm of the hydrogen atom. If we assume Bohr orbit to be the same as that represented by the principal quantum number?** 1) 10 2) 14 3) 12 4)16
25	**If the radius of the first Bohr orbit of Hydrogen atom is 'x', then the de-Broglie wavelength of electron in third orbit is nearly.** 1) $2\pi x$ 2) $6\pi x$ 3) $9x$ 4) $x/3$
26	**A single electron in an ion has ionization energy equal to 217.6eV. What is the total number of neutrons present in one ion of it?** 1) 2 2) 4 3) 5 4) 9
27	**In a certain electronic transition in the hydrogen atom from an initial state (1) to a final state (2), the difference in the orbital radius ($r_1 - r_2$) is 24 times the first Bohr radius. Identify the transition.** 1) $5 \rightarrow 1$ 2) $25 \rightarrow 1$ 3) $8 \rightarrow 3$ 4) $1 \rightarrow 5$
28	**I.E of He^+ is 19.6×10^{-18} J atom^{-1}. The energy of the Ist stationary state (n=1) of Li^{+2} is** 1) 4.41×10^{-16} J atom^{-1} 2) -4.41×10^{-17} J atom^{-1} 3) -2.2×10^{-15} J atom^{-1} – 4) -8.83×10^{-17} J atom^{-1}
29	**The ionization enthalpy of hydrogen atom is 1.312×10^6 J mol^{-1}. The energy required to excite the electron in the atom from n=1 to n=2 is** 1) 8.51×10^5 J mol^{-1} 2) 6.56×10^5 J mol^{-1} 3) 7.56×10^5 J mol^{-1} 4) 9.84×10^5 J mol^{-1}
30	**The kinetic energy of electron is $3.0 \times 10^{-25} J$. The wave length of the electron is** 1) $7965A^0$ 2)$4625A^0$ 3) $91A^0$ 4)$8967A^0$
31	**Which one of the following sets correctly represents the in case in the paramagnetic property of the ions.** 1) $Cu^{+2} > V^{+2} > Cr^{+2} > Mn^{+2}$ 2) $Cu^{+2} < Cr^{+2} < V^{+2} < Mn^{+2}$ 3) $Cu^{+2} < V^{+2} < Cr^{+2} < Mn^{+2}$ 4) $V^{+2} < Cu^{+2} < Cr^{+2} < Mn^{+2}$
32	**The magnetic moment of cobalt of the compound $Hg[Co(SCN)_4]$ is [Given :Co^{+2}]** 1) $\sqrt{3}$ 2) $\sqrt{8}$ 3) $\sqrt{15}$ 4) $\sqrt{24}$

33

List - I | **List - II**

I) ψ^2 depends only upon distance — a) p–orbitals

II) ψ^2 depends upon distance and on one direction — b) d–orbital

III) ψ^2 depends upon distance and on two directions — c) f–orbital

IV) ψ^2 depends upon distance and on three directions — d) s–orbitals

The correct match is

	I	II	III	IV
1)	d	c	b	a
2)	c	b	a	d
3)	d	a	b	c
4)	d	a	c	b

34

List - I

A) No of electrons present in an orbit

B) Number of orbitals in an orbit

C) Number of electrons in an orbital

D) Number of sub shells in an orbit

List-II

1) 2

2) n

3) n^2

4) $2n^2$

The correct match is

	A	B	C	D
1)	4	2	1	3
2)	1	2	3	4
3)	4	3	1	2
4)	2	1	3	4

35

Which electronic level would allow the hydrogen atom to absorb a photon but not to emit a photon

(1) $3s$ (2) $2p$ (3) $2s$ (4) $1s$

36

If electron, hydrogen, helium and neon nuclei are all moving with the velocity of light, then the wavelengths associated with these particles are in the order

(1) Electron > hydrogen > helium > neon (2) Electron > helium > hydrogen > neon

(3) Electron < hydrogen < helium < neon (4) Neon < hydrogen < helium < electron

37

The uncertainty in the position of an electron (mass = 9.1×10^{-28} g) moving with a velocity of $3.0\times10^{4}\,cm\,s^{-1}$ accurate upto 0.001% will be (Use $\frac{h}{4\pi}$ in the uncertainty expression, where $h = 6.626\times10^{-27}\,erg-s$)

(1) $1.92cm$ (2) $7.68\,cm$ (3) $5.76cm$ (4) $3.84\,cm$

38

Which of the following statements (s) is (are) not correct

(1) The electronic configuration of Cr is $[Ar]3d^5 4s^1$ (Atomic no. of $Cr = 24$)

(2) The magnetic quantum number may have a negative value

(3) In silver atom, 23 electrons have a spin of one type and 24 of the opposite type (Atomic no. of $Ag = 47$)

(4) The oxidation state of nitrogen in HN_3 is -3

39

The position of both an electron and a helium atom is known within $1.0nm$ and the momentum of the electron is known within $50\times10^{-26}\,kg\,ms^{-1}$. The minimum uncertainty in the measurement of the momentum of the helium atom is

(1) $50\,kg\,ms^{-1}$ (2) $60\,kg\,ms^{-1}$ (3) $80\times10^{-26}\,kg\,ms^{-1}$ (4) $50\times10^{-26}\,kg\,ms^{-1}$

40

The nucleus of an atom can be assumed to be spherical. The radius of the nucleus of mass number A is given by $1.25\times10^{-13}\times A^{1/3}cm$ Radius of atom is one A. If the mass number is 64, then the fraction of the atomic volume that is occupied by the nucleus is

(a) 1.0×10^{-3} (b) 5.0×10^{-5} (c) 2.5×10^{-2} (d) 1.25×10^{-13}

41 **The energy of an electron in the first Bohr orbit of H atom is $-13.6eV$. The possible energy value(s) of the excited state(s) for electrons in Bohr orbits to hydrogen is(are)**

(a) $-3.4eV$ (b) $-4.2eV$ (c) $-6.8eV$ (d) $+6.8eV$

42 **The total number of valence electrons in $4.2\,gm$ of N_3^- ion is (N_A is the Avogadro's number)**

(a) $1.6N_A$ (b) $3.2N_A$ (c) $2.1N_A$ (d) $4.2N_A$

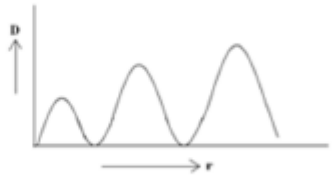
43 **The ionization energy of hydrogen atom is $-13.6\,eV$. The energy required to excite the electron in a hydrogen atom from the ground state to the first excited state is (Avogadro's constant = 6.022×10^{23})**

(a) $1.69 \times 10^{-20}\,J$ (b) $1.69 \times 10^{-23}\,J$ (c) $1.69 \times 10^{23}\,J$ (d) $1.69 \times 10^{25}\,J$

44 **The frequency of one of the lines in Paschen series of hydrogen atom is $2.340 \times 10^{11}\,Hz$. The quantum number n_2 which produces this transition is**

(a) 6 (b) 5 (c) 4 (d) 3

45 The following graph corresponds to



a) 3 s b) 3 p c) 4 p d) 5 d

1) a, b, c only 2) a & b only 3) a, b & c only 4) a, c & d only

46 In which of the following atoms 2s orbital has higher energy?

1) K 2) Na 3) H 4) Li

47 Which of the following statement about an electron with m= +3 is incorrect?

(1) The electron could be in the fourth shell (2) The electron is in a spherical orbital

(3) The electron may have s = +1/2 (4) The electron may have in a f-orbital

48 The total number of orbitals in first shell containing g-subshell will be ?

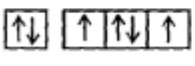
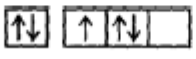
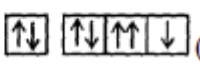
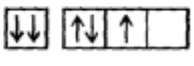
(1) 9 (2) 16 (3) 25 (4) 36

49 Arrange in decreasing order the energy of 2s orbital in the following atoms H, Li, Na, K

1) $E_{2s(H)} > E_{2s(Li)} > E_{2s(Na)} > E_{2s(K)}$ 2) $E_{2s(H)} > E_{2s(Na)} > E_{2s(Li)} > E_{2s(K)}$

3) $E_{2s(H)} > E_{2s(Na)} = E_{2s(K)} > E_{2s(Li)}$ 4) $E_{2s(K)} < E_{2s(Na)} < E_{2s(Li)} < E_{2s(H)}$

50 In which of the following orbital diagrams are both Pauli's exclusion principle and Hund's rule are violated?

(1)  (2)  (3)  (4) 

51 Which of the following statement in relation to the hydrogen atom is correct?

1) 3s, 3p and 3d orbitals all have the same energy

2) 3s and 3p orbitals are of lower energy than 3d orbital

3) 3p orbital is lower in energy than 3d orbital

4) 3s orbital is lower in energy than 3p orbitals

52 The correct order of relative stability of half filled and completely filled shells is:

1) $p^3 < d^5 < d^{10} < p^6$ 2) $d^5 < p^3 < d^{10} < p^6$ 3) $d^5 < p^3 < d^{10} < p^6$ 4) $p^3 < d^{10} < d^5 < p^6$

53 An atom has 35 nucleons and has atomic number equal to 17. The number of electrons with n = 2,m = 0 in it is :-

(1) 2 (2) 4 (3) 6 (4) 3

54 For the electrons of oxygen atom, which of the following statements is correct?

1) Z_{eff} for an electron in a $2s$ orbital is the same as Z_{eff} for an electron is a $2p$ orbital

2) An electron in the $2s$ orbital has the same energy as an electron in the $2p$ orbital

3) Z_{eff} for an electron in $1s$ orbital is the same as Z_{eff} for an electron in a $2s$ orbital

4) The two electrons present in the $2s$ orbital have same spin quantum numbers m_s but of opposite sign.

55 Match the following

Column-I	Column-II
(i)X-rays	(a) $v = 10^0 - 10^4\ Hz$
(ii) UV-rays	(b) $v = 10^{10}\ Hz$
(iii) Long radio waves	(c) $v = 10^{16}\ Hz$
(iv) Microwave	(d) $v = 10^{18}\ Hz$

1) i-d, ii-c, iii-a, iv-b 2) i-b, ii- a, iii-c, iv-d 3) i-d, ii-a, iii-c, iv-d 4) i-a, ii-d, iii-c, iv-d

56 When a metallic surface is illuminated with radiation of wavelength λ, the stopping potential is V. If the same surface is illuminated with radiation of wavelength 2λ, the stopping potential is $\frac{V}{4}$. The threshold wavelength for the metallic surface is:

1) 3λ 2) 4λ 3) 5λ 4) $\frac{5}{2}\lambda$

57 Arrange the following electromagnetic radiations per quantum in the order of increasing energy:

A: Blue light B: Yellow light C: X-ray D: Radiowave

1) D, B, A, C 2) A, B, D, C 3) C, A, B, D 4) B, A, D, C

58 Rutherford's experiment which established the nuclear model of the atom used a beam of:

1) β^- particle, which impinged on a metal foil and got absorbed

2) γ^- rays, which impinged on a metal foil and ejecred electrons

3) helium atoms, which impinged on a metal foil and got scattered

4) helium nuclei, which impinged on a metal foil and got scattered

59 ψ_{320} Represents

1) 3s Orbital 2) 3d Orbital 3) 3p Orbital 4) 3f Orbital

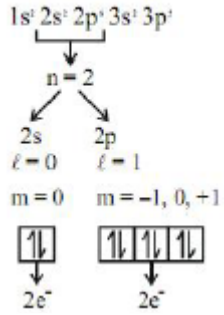
KEY

1	**ANS-4**
2	**ANS-3**
3	**ANS-3** $h\nu = W + K.E\ ;\ W = h\nu - K.E$: **(3)**
4	**ANS-1** $E = \frac{hc}{\lambda}; \frac{1}{\lambda} = R[\frac{1}{n_1^2} - \frac{1}{n_2^2}]$: **(1)**
5	**ANS-1** $\Delta E = Rhc\left[\frac{1}{n_1^2} - \frac{1}{n_2^2}\right]$ **(3)**
6	**ANS-1** $V_n = \frac{v_1}{n}$: **(1)**
7	**ANS-2** $\lambda = V\ ;\ \therefore \lambda = \frac{h}{mV}\ ;\ \lambda = \frac{h}{m \times \lambda}$ $\lambda^2 = \frac{h}{m} \qquad \lambda = \sqrt{\frac{h}{m}}$ **(2)**
8	**ANS-3** : $\Delta x.\Delta p \geq \frac{h}{4\pi}\ ;\ \Delta x^2 \geq \frac{h}{4\pi};\ \Delta x \geq \sqrt{\frac{h}{4\pi}}$ $\Delta v \geq \frac{h}{4\pi.m.\Delta x};\ \Delta v \geq \frac{1}{2m}\sqrt{\frac{h}{\pi}}$: **(3)**
9	**ANS-1** $\lambda = \frac{h}{mv}\ ;\ \frac{\lambda_A}{\lambda_B} = \frac{m_B.v_B}{m_A.v_A}$: **(1)**
10	**ANS-4** $\Delta x.m.\Delta v = \frac{h}{4\pi}\ \ \Delta x = \frac{h}{4\pi.m.\Delta v}$: **(4)**

11	**ANS-4** Conceptual : **(4)**
12	**ANS-2** :Conceptual : **(2)**
13	**ANS-2** :Conceptual : **(2)**
14	**ANS-1** : $\text{Avg.at.wt} = \frac{\sum \%\text{abundance} \times \text{Atomicweight}}{\text{Totalratio}}$: **(1)**
15	**ANS-2** $v_1 = \frac{c}{\lambda_1}; v_2 = \frac{c}{\lambda_2} \qquad \frac{E_1}{E_2} = \frac{v_1}{v_2}$: **(2)**
16	**ANS-2** $\frac{K.E_2}{K.E_1} = \frac{v_2 - v_0}{v_1 - v_0}$: **(2)**
17	**ANS-2** As the size of atom increases, energy required to over come the attractive forces on the outer most electron decreases. : **(2)**
18	**ANS-2** $h\nu = W + \frac{1}{2}mv^2; \frac{hC}{\lambda} = W + \frac{1}{2}mv^2$ $(\because 1eV = 1.6 \times 10^{-19} J) \quad W = 2.13 \times 1.6 \times 10^{-19} J$: **(2)**
19	**ANS-2** $K.E = h(v - v_0) \Rightarrow \frac{1}{2}mv^2 = h(v - v_0)$ $\therefore v^2 = \frac{2h(v - v_0)}{m}; v_1^2 = \frac{2h(2f_0 - f_0)}{m} \text{-----} (1)$ $v_2^2 = \frac{2h(5f_0 - f_0)}{m} \text{--------} 2$: **(2)**
20	**ANS-1** Balmer series - visible region,for the line of balmer series energy is maximum : **(1)**

21	**ANS-2** $\frac{E_1}{3^2}-\frac{E_1}{2^2}=E \Rightarrow \frac{-5E_1}{36}=E$ $E_1=-7.2E$; $I.E=+E_1=+7.2\,E$ **(2)**
22	**ANS-2** $E\alpha\frac{Z^2}{n^2}$ **(2)**
23	**ANS-1** $\bar{\nu}=\frac{1}{\lambda}=R[\frac{1}{n_1^2}-\frac{1}{n_2^2}]$ **: (1)**
24	**ANS-2** $r_n=0.529\times n^2A^0$; diameter = 2r ; $r=\frac{diameter}{2}$ **(2)**
25	**ANS-2** $r_n=n^2r_1$; $mv_nr_n=\frac{nh}{2\pi}$; $\lambda=\frac{h}{mv_n}$ **(2)**
26	**ANS-3** Ionization energy $-217.6=-13.6\times\frac{Z^2}{1^2}; Z=4m$ So, it is ${}^{9}_{4}Be^{3+}$; no. of neutrons 9 - 4 = 5 **: (3)**
27	**ANS-1** $r_1-r_2=0.529\left(n_1^2-n_2^2\right)$ **(1)**
28	**ANS-2** $I.E=-E_1\ \ E_n\propto\frac{z^2}{n^2}\Rightarrow\frac{(E_1)_{He^+}}{(E_1)_{Li^{+2}}}=\frac{(z_{He^+})^2}{(z_{Li^{+2}})^2}$ **(2)**
29	**ANS-2** $E_H\left(\frac{1}{n_1 2}-\frac{1}{n_2 2}\right)=1.312\times10^6\left(\frac{1}{1}-\frac{1}{4}\right)$ **: (2)**

30	**ANS-4** $\lambda = \frac{h}{\sqrt{2mkE}}$: (4)
31	**ANS-3** paramagnetic property depends upon the number of unpaired electrons ,higher the no.of unpaired electrons , higher the paramagnetic property. : (3)
32	**ANS-3** $\mu = \sqrt{n(n+2)}$; n = n of unpuried electory (3)
33	**ANS-3** Conceptual : (3)
34	**ANS-3** Conceptual : (3)
35	**ANS-4** Sol: (4) 1*s*-orbital is of lowest energy. Absorption of photon can raise the electron in higher energy state but emission is not possible.
36	**ANS-1** *Sol: (1)* $\lambda \propto \frac{1}{m}, m_e < m_H < m_{He} < m_{Ne}.$
37	**ANS-1** : *(1)* $\Delta p = m \times \Delta v$; $\Delta p = 9.1 \times 10^{-28} \times 3.0 \times 10^{4} \times \frac{0.001}{100}$; $\Delta P = 2.73 \times 10^{-24}$ *Hence* $\Delta x = \frac{h}{\Delta p \times 4\pi} = \frac{6.626 \times 10^{-27}}{2.73 \times 10^{-28} \times 4 \times 3.14}$; $\Delta x = 1.92\ cm.$
38	**ANS-4** *(4) The oxidation state of nitrogen in* HN_3 *is* $-\frac{1}{3}$. ; HN_3 : $1+3x=0 \Rightarrow 3x=-1$ or $x=\frac{-1}{3}$
39	**ANS-4** *Sol: (4) The product of uncertainties in the position and the momentum of a sub atomic particle* $= h/4\pi$. *Since* Δx *is same for electron and helium so* Δp *must be same for both the particle i.e.* $50 \times 10^{-26}\ kg\ ms^{-1}$ *(given).*
40	**ANS-D** Sol: (d) Radius of nucleus $= 1.25 \times 10^{-13} \times A^{1/3}\ cm = 1.25 \times 10^{-13} \times 64^{1/3} = 5 \times 10^{-13}\ cm$ Radius of atom = $1\text{Å} = 10^{-8}\ cm$. ; $\frac{\text{Volume of nucleus}}{\text{Volume of atom}} = \frac{(4/3)\pi(5 \times 10^{-13})^3}{(4/3)\pi(10^{-8})^3} = 1.25 \times 10^{-13}$.
41	**ANS-A** Sol: (a) Values of energy in the excited state $= -\frac{13.6}{n^2} eV = \frac{-13.6}{4} = -3.4\ eV$ in which $n = 2, 3, 4$ *etc.*

42	**ANS-A** Sol: (a) $42g$ of N_3^- ions have $16N_A$ valence electrons $4.2g$ of N_3^- ion have $=\frac{16\,N_A}{42}\times 4.2 = 1.6\,N_A$
43	**ANS-B** Sol: (b) $E=\frac{-13.6}{n^2}=\frac{-13.6}{4}=-3.4\,eV$ We know that energy required for excitation $\Delta E = E_2 - E_1$ $=-3.4-(-13.6)=10.2\,eV$ Therefore energy required for excitation of electron per atom $=\frac{10.2}{6.02\times10^{23}}=1.69\times10^{-23}\,J$
44	**ANS-B** Sol: (b) $\bar{v}=\frac{1}{\lambda}=R_H\left[\frac{1}{n_1^2}-\frac{1}{n_2^2}\right]=\frac{1}{\lambda}=R_H\left[\frac{1}{3^2}-\frac{1}{n_2^2}\right]=n_2=3$ for Paschen series.
45	**ANS-4**
46	**ANS-3** (3)Greater the effective nuclear charge lesser the energy of the orbital Energy of 2s orbital $\propto\frac{1}{Z}$
47	**ANS-2**
48	**ANS-1**
49	**ANS-1** (1) $E_{2s(H)} > E_{2s(Li)} > E_{2s(Na)} > E_{2s(K)}$
50	**ANS-4**
51	**ANS-3**
52	**ANS-3** (3)Completely filled and half filled p – sub – shells are more stable than d – sub – shells
53	**ANS-2** (2)A = 35 ;Z = 17 
54	**ANS-4**
55	**ANS-1**
56	**ANS-1**
57	**ANS-1**
58	**ANS-4**
59	**ANS-2**