

31(a) Neon has 10 electrons  $\therefore F^{-10}$   
isoelectronic with Ne

32. (b)

33. (d)  $\lambda_{\text{max}} = 12.1 \times 10^{-8} \text{ m} = \frac{c}{\nu}$   
 $\therefore \nu = \frac{c}{\lambda} = \frac{3 \times 10^8}{12.1 \times 10^{-8}} = 2.48 \times 10^{15} \text{ s}^{-1}$

34. (a)  $E_{\text{photon}} = \frac{nhc}{\lambda} = nhc\nu$   
 $\therefore 1 = \frac{nhc \times 6.6 \times 10^{-34} \times 2.48 \times 10^{15}}{2 \times 10^{-8}}$   
 $\therefore n = 2$

35. (d)  $KE = h\nu - h\nu_0 = 6.2 - 4.2 = 2 \text{ eV}$   
 $= 2 \times 1.6 \times 10^{-19} \text{ J} = 3.2 \times 10^{-19} \text{ J}$

M 36.(b)  $K.E = 5.45 \times 10^{-19} \text{ (J)}$  (2)

$\therefore T.E = -K.E = -5.45 \times 10^{-19} \text{ (J)}$   
 $T.E = \frac{-5.45 \times 10^{-19} \times (eV)}{1.6 \times 10^{-19}}$

$T.E = -3.40 = \frac{-13.6}{n^2}$  (d)

$\therefore n = 2$

M 37.(d)  $\bar{v}_1 = 15200 = R \times 1 \times \left[ \frac{1}{4} - \frac{1}{3} \right]$

$\bar{v}_2 = R \times 9 \times \left[ \frac{1}{4} - \frac{1}{9} \right]$

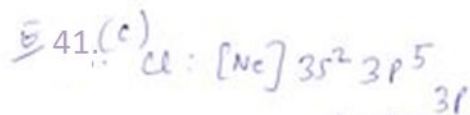
On dividing  $\frac{15200}{\bar{v}_2} = \frac{1}{9}$

$\therefore \bar{v}_2 = 9 \times 15200 = 136800 \text{ cm}^{-1}$

M 38.  $\lambda = \frac{h}{\sqrt{2m(K.E)}} = \frac{6.6 \times 10^{-34}}{\sqrt{2 \times 9.1 \times 10^{-31} \times 2.8 \times 10^{-18}}}$   
 $\lambda = 9.24 \times 10^{-8} \text{ m}$

(E) 39.(c) For 4f orbital  
 $n=4, l=3, m$  can be from  $-3$  to  $+3$

(E) 40.(a) Designation of electron are  
(i) 4f (ii) 4s (iii) 3d (iv) 3p  
 $\therefore$  increasing energy sequence is  
(iv) < (ii) < (iii) < (i)



1	1	1
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For unpaired electron of chlorine  
 $n=3, l=1, m=+1$

Q 42. (d)  $\text{Mg}^{2+}$  has no unpaired electrons

$\text{Ti}^{3+}$  has 1 unpaired electron  $[4s^0 3d^1]$

$\text{V}^{3+}$  has 2 unpaired electrons  $[4s^0 3d^2]$

$\text{Fe}^{3+}$  has 5 unpaired electrons  $[4s^0 3d^5]$

Q 43. (c) The designation of electron are

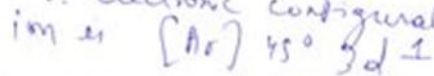
a) 3d b) 4p c) 4d d) 5s

4d has the highest energy

Q 44. (a)  $\mu = \sqrt{(n+2)(n)} = 1.73$

$\therefore n = 1$  (1 unpaired electron)

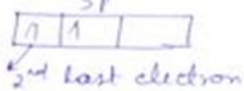
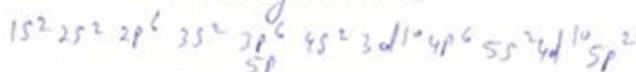
$\therefore$  electronic configuration of vanadium



45. (c)



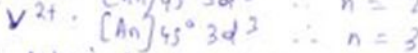
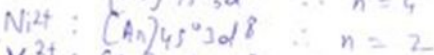
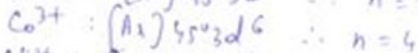
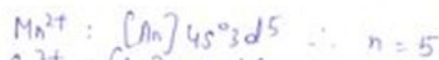
M 46. (a) Electronic Configuration is (4)



↳ 2<sup>nd</sup> last electron

$$\therefore n = 5, l = 1, m = -1, 0, 1$$

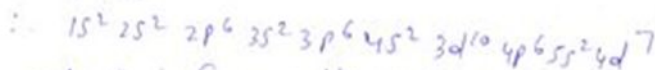
M 47. (c)



$\therefore Ni^{2+}$  is having minimum unpaired electron

M 48. (d)

$$Z = 45$$



$n+l = 5$  is for  $3d^{10}, 4p^6, 5s^2$

$$\therefore \text{Total electron} = 18$$

M 49. (c)

$$\Delta E = 13.6 Z^2 \left[ \frac{1}{1} - \frac{1}{n_2^2} \right] = 13.056$$

$$\therefore n_2 = 5$$

$$\text{In visible region lines} = \frac{(n-2)(n-1)}{2} = \frac{5-2}{2} = 3$$

M 50. (b)

$$\text{I.E. of Li} = 122.4 \text{ eV}$$

$\therefore$  Energy supplied  $>$  I.E.

$\therefore$  Electron gains K.E.

$$\therefore \text{K.E gained} = (150 - 122.4) \text{ eV} \quad \textcircled{5}$$

$$= 27.6 \text{ eV} = 27.6 \times 1.6 \times 10^{-19} \times 10^{-3} \text{ kJ}$$

$$= 4.4 \times 10^{-21} \text{ kJ}$$

E 51. (c) 3s orbital has 2 radial nodes  
 $\therefore$  (c) is correct

E 52. (d)  $d_{z^2}$  because of electron ring lying on xy plane cannot have any angular nodes

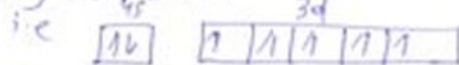
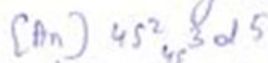
E 53. (d) 3dxy is having 2 nodal plane i.e. xz plane and yz plane

D 54. (a)  $\mu = \sqrt{n(n+2)} = 2.82$

$\therefore n = 2$

$\therefore \text{Mn has 2 unpaired electron}$

Normal configuration of Mn is



To attain 2 unpaired electron, 2 electrons from 4s and 3 electrons from 3d has to be removed  $\therefore$  charge = 5+

M 55. (b)  $K.E = \frac{1}{2} \frac{KZe^2}{a_1}$   
 $P.E = -\frac{KZe^2}{a_1}$   
 $\therefore K.E = -\frac{1}{2} P.E$

(6)

E 56. (c) Total energy =  $-\frac{2\pi^2 m Z^2 e^4 / c^2}{n^2 h^2}$

M 57. (c)  $K.E = -T.E$   
 $\therefore T.E$  in 3rd excited state of  $G^{4+} = \frac{-13.6 \times 9}{16} eV$   
 $\therefore K.E = +13.6 \times 9 / 16$   
 $P.E = 2 T.E$   
 $\therefore P.E$  in 4th excited state of  $Be^{3+}$   
 $= 2 \times \frac{-13.6 \times 16}{1}$   
 $\therefore \frac{K.E}{P.E} = \frac{25}{512}$

E 58. (c) velocity =  $\frac{2\pi KZe^2}{nh}$

M 59. (a) Orbital angular momentum =  $\frac{\sqrt{l(l+1)} h}{2\pi}$   
 $\therefore$  for f-subshell  $l = 3$   
 $\therefore$  Orbital angular momentum =  $\sqrt{3 \times 4} \frac{h}{2\pi}$   
 $= 2\sqrt{3} \frac{h}{2\pi}$

E 60. (c) 4th shell has 4 subshell i.e.  
 4s 4p 4d 4f  
 Total orbital =  $1+3+5+7 = 16$