

$$41.)^a) n=4 \quad l=0 \ 1 \ 2 \ 3$$

b)  $\ell = 2 \quad m_\ell = -2, -1, 0, 1, 2$

45.)<sup>a)</sup> l\_p not possible n=1 l=0 (l=1=p)

b.) 4s possible  $n=4$   $J=0, 1, 2, 3$   
 $S, P, D, F$

c.) 5F possible  $n=5$   $\ell = 0 \ 1 \ 2 \ 3$   
                          s p d f

d.) 2d not possible  $n=2$   $l=0, 1$

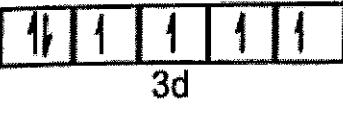
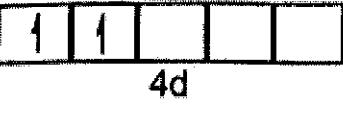
24.) Pauli in order for all  $e^-$  to have their own set of 4 quantum #'s  $M_s = \frac{1}{2}, -\frac{1}{2}$  this way 2  $e^-$  in the same orbital can be distinguished.

	n	l	m_l	ms	+1/2	-1/2
1S <sup>2</sup>	1	0	0			
			0			
			0			

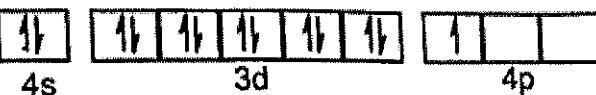
- are - 10 (b) 2 (c) 6 (d) 14  
 (a) 10 (b) 2 (c) 6 (d) 14  
 6.56 (a) 4 (b) 14 (c) 2 (d) 2

- 6.57 (a) Each box represents an orbital.  
 (b) Electron spin is represented by the direction of the half-arrows.  
 (c) No. The electron configuration of Be is  $1s^2 2s^2$ . There are no electrons in subshells that have degenerate orbitals, so Hund's rule is not used.
- 6.58 (a) "Outer-shell electrons" are those beyond the previous noble-gas or core electron configuration.  
 (b) "Unpaired electrons" are electrons that occupy orbitals singly. That is, when there is only one electron in an orbital, this electron is "unpaired."  
 (c) A Si atom has 4 outer-shell electrons:  $3s^2 3p^2$ . Two of them (those in the degenerate  $3p$  orbitals) are unpaired.

- 6.59 (a) Cs: [Xe]6s<sup>1</sup> (b) Ni: [Ar]4s<sup>2</sup>3d<sup>8</sup> (c) Se: [Ar]4s<sup>2</sup>3d<sup>10</sup>4p<sup>4</sup>  
 (d) Cd: [Kr]5s<sup>2</sup>4d<sup>10</sup> (e) Ac: [Rn]7s<sup>2</sup>6d<sup>1</sup> (f) Pb: [Xe]6s<sup>2</sup>4f<sup>14</sup>5d<sup>10</sup>6p<sup>2</sup>  
 6.60 (a) Al: [Ne]3s<sup>2</sup>3p<sup>1</sup> (b) Sc: [Ar]4s<sup>2</sup>3d<sup>1</sup> (c) Co: [Ar]4s<sup>2</sup>3d<sup>7</sup>  
 (d) Br: [Ar]4s<sup>2</sup>3d<sup>10</sup>4p<sup>5</sup> (e) Ba: [Xe]6s<sup>2</sup> (f) Re: [Xe]6s<sup>2</sup>4f<sup>14</sup>5d<sup>5</sup>  
 (g) Lu: [Xe]6s<sup>2</sup>4f<sup>14</sup>5d<sup>1</sup>

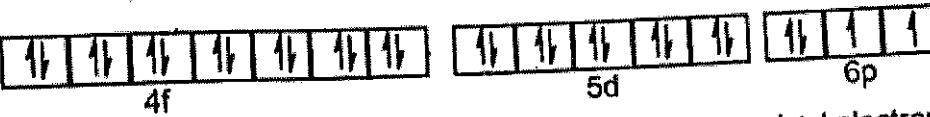
- 6.61 (a) S: [Ne]  2 unpaired electrons  
 (b) Sr: [Kr]  0 unpaired electrons  
 (c) Fe: [Ar]  4 unpaired electrons  
 (d) Zr: [Kr]  2 unpaired electrons  
 (e) Sb: [Kr]  3 unpaired electrons

6.62 (a) Ti: [Ar]  2 unpaired electrons

(b) Ga: [Ar]  1 unpaired electron

(c) Rh: [Kr]  3 unpaired electrons

(d) I: [Kr]  1 unpaired electron

(e) Po: [Xe]  2 unpaired electrons

6.63 (a) Mg (b) Al (c) Cr (d) Te

6.64 (a) 7A (halogens) (b) 4B (c) 3A (d) the f-block elements Sm and Pu

6.65 (a) The fifth electron would fill the 2p subshell (same *n*-value as 2s) before the 3s.

(b) The Ne core has filled 2s and 2p subshells. Either the core is [He] or the outer electron configuration should be  $3s^23p^3$ .

(c) The 3p subshell would fill before the 3d because it has the lower *l*-value and the same *n*-value.

6.66 Count the total number of electrons to assign the element.  
 (a) N: [He] $2s^22p^3$  (b) Se: [Ar] $4s^23d^{10}4p^4$  (c) Rh: [Kr] $5s^24d^7$

### Additional Exercises

$$6.67 \text{ (a)} \quad \lambda_A = 1.6 \times 10^{-7} \text{ m} / 4.5 = 3.56 \times 10^{-8} = 3.6 \times 10^{-8} \text{ m}$$

$$\lambda_B = 1.6 \times 10^{-7} \text{ m} / 2 = 8.0 \times 10^{-8} \text{ m}$$

$$\Delta v = \frac{2.998 \times 10^8 \text{ m}}{1 \text{ s}} \times \frac{1}{3.56 \times 10^{-8} \text{ m}} = 8.4 \times 10^{15} \text{ s}^{-1}$$