Chapter 13 Configuration worksheet Key

On all math problems show the given, formula used and the work to receive full credit

$h = 6.6262 \times 10^{-34}$ J s $c = \lambda \nu$ $E = h\nu$

1. Write the electron configuration and draw the orbital diagrams for the following:
   a. Antimony $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 4s^2\ 3d^{10}\ 4p^6\ 5s^2\ 4d^{10}\ 5p^3$ (Sb)
   b. Cobalt $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 4s^2\ 3d^7$ (Co)
   c. Barium $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 4s^2\ 3d^{10}\ 4p^6\ 5s^2\ 4d^{10}\ 5p^6\ 6s^2$ (Ba)
   d. Copper $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 4s^2\ 3d^9$ (Cu)
   e. Xenon $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 4s^2\ 3d^{10}\ 4p^6\ 5s^2\ 4d^{10}\ 5p^6$ (Xe)
   f. Silver $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 4s^2\ 3d^{10}\ 4p^6\ 5s^2\ 4d^9$ (Ag)
   g. Holmium (#67) $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 4s^2\ 3d^{10}\ 4p^6\ 5s^2\ 4d^{10}\ 5p^6\ 6s^2\ 4f^{11}$ (Ho)

2. Write the electron configuration and draw the orbital diagrams for the following:
   a. N^{-3} $1s^2\ 2s^2\ 2p^6$
   b. Se^{-2} $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 4s^2\ 3d^{10}\ 4p^6$
   c. I^{-1} $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 4s^2\ 3d^{10}\ 4p^6\ 5s^2\ 4d^{10}\ 5p^6$
   d. Ca^{+2} $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6$
   e. O^{-2} $1s^2\ 2s^2\ 2p^6$
   f. Fe^{+3} $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 4s^0\ 3d^5$

3. State the 3 rules for electron configuration.
   (1) Aufbau Principle - start at Lowest Energy Level Always
   (2) Pauli Exclusion - an orbital can only hold 2 electrons
   (3) Hund's Rule - each orbital recieves one electron Before Any Recieve 2nd

4. What is the wavelength of light with the energy of 4.2×10^{-18} J? (2 steps needed to solve)

   Given:
   $\lambda = ?$
   $E = 4.2 \times 10^{-18}$ J
   $h = 6.6262 \times 10^{-34}$ J·s
   $c = 3.00 \times 10^8$ m/s
   $\upsilon = ?$

   Soln: (2nd) $c = \lambda\upsilon$ (1st) $E = h\upsilon$

   $\upsilon = E/h = \frac{4.2 \times 10^{-18}\ J}{6.6262 \times 10^{-34}\ J \cdot s}$

   $\upsilon = 6.3 \times 10^{15}$ 1/s

   $\lambda = \frac{c}{\upsilon}$

   $\lambda = \frac{3.00 \times 10^8\ m/s}{6.3 \times 10^{15}\ 1/s}$

   $\lambda = 4.8 \times 10^{-8}$ m

5. Explain how Iron can have more than one possible electron configuration.
   Fe^{+2} $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 4s^0\ 3d^6$
   Fe^{+3} $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 4s^0\ 3d^5$
   3d5 is more Stable than 3d6