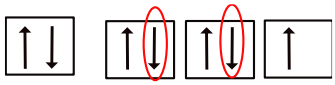
Quantum Numbers

1. Define the quantum number, n.
   This is the principal energy level quantum number. It can have integer values of 1 to ∞.
2. Define the quantum number, l. Indicate what values l can have as well as the corresponding subshell.
   The azimuthal (angular momentum) quantum number. It indicates the subshell.
   s subshell, l = 0; p subshell, l =1; d subshell, l = 2; f subshell, l = 3
3. Define the quantum number, m_l. Indicate the values m_l can have.
   Magnetic quantum number. Defines the spatial orientation of an orbital. It can have values of -l to +l.
4. Define the quantum number, m_s and indicate its values.
   The electron spin quantum number. Values can be +1/2 or -1/2
5. Assign quantum numbers to the two outermost electrons of Br (follow the correct order of orbital filling).
   The valence shell electrons for Br are shown. The circled electrons are the 2 outermost electrons.



n = 4, l =1, m_l = -1, m_s = -1/2
n = 4, l = 1, m_l = 0, m_s = -1/2

6. Assign quantum numbers to the valence electrons of Sr.
   Sr has 2 valence electrons in the 5s.
   n = 5, l = 0, m_l = 0, m_s = +1/2
   n = 5, l = 0, m_l = 0, m_s = -1/2

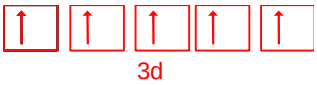
7. Which of the following **is not** a valid set of quantum numbers?

a) n = 2, l = 2, m_l = 0, m_s = + 1/2 b) n = 4, l = 3, m_l = -3, m_s = +1/2

c) n = 5, l = 3, m_l = -4, m_s = -1/2 d) n = 5, l = 3, m_l = -4, m_s = +1/2

e) n = 7, l = 0, m_l = -2, m_s = -1/2 f) n = 3, l = 2, m_l = +2, m_s = -1/2

8. Assign quantum numbers to each of the electrons in the 3d subshell of Cr. Cr has an analogous configuration.



Going from left to right using the proper filling order:

n = 3, l = 2, m_l = -2, m_s = +1/2; n = 3, l = 2, m_l = -1, m_s = +1/2;
n = 3, l = 2, m_l = 0, m_s = +1/2; n = 3, l = 2, m_l = +1, m_s = +1/2
l = 2, m_l = +2, m_s = +1/2