**Quantum Numbers Homework**

1. You are dealing with Cobalt (Co) which has a notation of [Ar]4s23d7. Describe how you would fill in the orbital diagram for the D-section. Which rule/principle explains why you fill in the arrows this way?
2. Name two elements that can be described by the following quantum numbers:
3. *n* = 3, *l* = 0 \_\_\_\_\_\_\_\_
4. *n* = 3, *l* = 1 \_\_\_\_\_\_\_\_
5. *n* = 3, *l* = 2 \_\_\_\_\_\_\_\_
6. *n* = 5, *l* = 0 \_\_\_\_\_\_\_\_
7. Give the n and l values for the following orbitals
   1. 1s *n* = \_\_\_\_\_ and *l* = \_\_\_\_\_\_
   2. 3s *n* = \_\_\_\_\_ and *l* = \_\_\_\_\_\_
   3. 2p *n* = \_\_\_\_\_ and *l* = \_\_\_\_\_\_
   4. 4d *n* = \_\_\_\_\_ and *l* = \_\_\_\_\_\_
   5. 5f *n* = \_\_\_\_\_ and *l* = \_\_\_\_\_\_
8. Place the following orbitals in order of increasing energy. Additionally, which rule/principle indicates that you should fill electrons in order of increasing energy?

    1s, 3s, 4s, 6s, 3d, 4f, 3p, 7s, 5d, 5p

1. What are all of the possible *m* values for the following types of orbitals?
   1. s *ml* could equal \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
   2. p *m*l could equal \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
   3. d *ml* could equal \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
   4. f *ml* could equal \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
2. Write the correct noble gas notation, orbital diagram AND four quantum numbers for the following:
   1. Tantalum (Ta)
   2. Selenium (Se)
   3. Neptunium (Np)
   4. Barium (Ba)
3. Identify the element, using the quantum numbers provided.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| ***n*** | ***l*** | ***ml*** | ***ms*** | **Element?** |
| 1 | 0 | 0 | ½ |  |
| 2 | 1 | +1 | -½ |  |
| 2 | 0 | 0 | -½ |  |
| 4 | 2 | -2 | ½ |  |
| 2 | 1 | -1 | ½ |  |
| 3 | 2 | -1 | ½ |  |
| 3 | 1 | 0 | 0 |  |
| 3 | 1 | 1 | ½ |  |
| 3 | 0 | 0 | -½ |  |
| 1 | 3 | -3 | ½ |  |