Practice on Quantum Numbers key

1. Answer the following:
2. How many orbitals in the *l* = 1 subshell?

**The *l* = 1 subshell is also called the *p* subshell. All *p* subshells contain 3 orbitals.**

1. What is the maximum number of electrons in a *d* subshell?

**All *d* subshells contain 10 electrons.**

1. What is the subshell designation when *n* = 3 and *l* = 2?

**The *l* = 2 subshell is also called the *d* subshell. So the subshell designation is 3*d*.**

1. How many subshells in the *n* = 4 shell?

**The *n* = 4 shell contains 4 subshells.**

1. Briefly explain what the term *degeneracy* means when used to describe features of the energy level diagram for a multi-electron atom.

**Degeneracy means equal in energy. In a multi-electron atom, orbitals in the same subshell are degenerate. For example the three orbitals in the *p* subshell are all degenerate in energy.**

1. Briefly describe the difference between an *orbit* and an *orbital* as it relates to an electron in a hydrogen atom.

**An orbit is a circular path around the nucleus. According to Bohr's model, only orbits with specific radii are allowed. Orbits are specified by a single quantum number. An orbital is a volume of space specified by 3 quantum numbers where the probability of finding the electron is greatest.**

1. Sketch the orbital diagram for the valence electrons in copper.



1. Write the short hand electron configuration for each of the following.

a) Cu **[Ar] 4*s* 13*d*10**


b) Ca2+  **[Ne]3*s* 23*p*6**

c) Po **[Xe] 6*s* 24*f*145*d*106*p*4**

d) Se2-**[Ar] 4s23d104p6**

e) Ir **[Xe] 6s24f145d7**

1. Write the possible set of quantum numbers for all valence electron in an antimony (Sb) atom in its ground state.



1. Given the five orbital diagrams labeled A, B, C, D, and E.



From the orbital diagrams select an example which demonstrates
i). a violation of Hund's rule **C**

ii). a violation of the Pauli exclusion principle **D**

iii). a ground state orbital diagram **A**

iv). an excited state orbital diagram **E or B**

v). a violation of the Aufbau principle **B or E**