Chemistry I-Standard

Orbital Diagrams Problem Set

1. What is the difference between the previous models of the atom and the modern quantum mechanical model?

2. The further the electron is from the nucleus, the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ energy the electron has.

3. A(n) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ is often thought of as a region of space in which there is a high probability of finding an electron.

4. What is the term used to label the energy levels of electrons? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

5. How are s orbitals different from p orbitals? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

6. How many electrons can each of the following orbitals hold?

 a. 2s = \_\_\_\_\_\_\_\_ d. 6d = \_\_\_\_\_\_\_\_

 b. 3p = \_\_\_\_\_\_\_\_ e. 4p = \_\_\_\_\_\_\_\_

 c. 5f = \_\_\_\_\_\_\_\_\_ f. 3d = \_\_\_\_\_\_\_\_

7. How many “p” orbitals can there be in any energy level? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

8. What is the ***maximum*** number of electrons in the 3rd principle energy level? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

9. How many orbitals are in each of the following sublevels??

 a. 4*p* sublevel \_\_\_\_\_\_\_\_\_\_\_\_ c. 4*f* sublevel \_\_\_\_\_\_\_\_\_\_\_\_

 b. 3*d* sublevel \_\_\_\_\_\_\_\_\_\_\_\_ d. 2*s* sublevel \_\_\_\_\_\_\_\_\_\_\_\_

10. Which element has the following orbital diagram?



11. Using arrows, show how the following orbitals will fill with electrons.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | *Electron Configuration* | **1s** | **2s** |  | **2p** |  | **3s** |  | **3p** |  | **4s** |  |  | **3d** |  |  |
| **Mg** | 1s22s22p63s2 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **Cl** | 1s22s22p63s23p5 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **Si** | 1s22s22p63s23p2 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **Ti** | 1s22s22p63s23p64s23d2 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |