Accelerated General Chemistry
Problem Set 3
Due Wednesday, September 30, 2009 (at 4:00 p.m.)
Total Points on This Assignment = 46

1. I expect you to remember (or review) the basics about writing the ground-state electron configurations of atoms. Problems 5, 6, and 7 draw on this knowledge. What I will emphasize in class are the quantum mechanical reasons underlying what are hopefully familiar rules.
2. Atkins and Jones have delayed their complete discussion of the electron configurations of ions until Chapter 2 (pp. 58-60). Pedagogically, I think this is strange because I can't imagine being able to think about trends in the sizes of ions (pp. 41-42) if you don't know what the electron configurations of those ions are! Please read pp. 58-60, and note that Problem 6 is based on this material.

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1. (8 points) Atkins and Jones Exercise 1.50. Briefly justify each answer.

2. (6 points) For each of the following four orbitals, write down (i) the number of angular nodes, (ii) the number of radial nodes, and (iii) the number of possible orientations.
   (a) 2*s*; (b) 6*f*; (c) 4*d*; (d) 5*p*.
   You do not need to justify your answers.

3. (4 points) Exercise 1.62. Briefly explain what is invalid about the subshell labels you reject.

4. (4 points) Exercise 1.70

5. (6 points) What is the ground-state electron configuration expected for each of the following elements: (a) sulfur; (b) cesium; (c) polonium; (d) molybdenum; (e) rhenium; (f) vanadium? Please use "noble gas shorthand" to make your answers more compact. Note that it is OK just to write down the answers; they do not need to be justified.

6. (8 points) Exercise 2.10. (This is not a typo.) You must justify each answer by first writing the ground-state electron configuration of the corresponding neutral atom. Again, please use noble gas shorthand.

7. (8 points) Exercise 1.80. Justify each of your answers with an orbital diagram showing the valence electron configuration. (Note that filled *d* and *f* subshells do not need to be included in your orbital diagrams.)

8. (2 points) Exercise 1.110