CH301 Fall 2009 Worksheet 3 on Electronic Configuations and Periodic Table Trends

1. Write the electron configuration of gallium (Ga) in long notation and in short notation.

2. Write the electron configuration of a divalent vanadium cation (V^{2+}) in long and in short notation.3. Write the electron configuration of a monovalent iodine anion (I^-) in long and in short notation.

4. State in your own words the Pauli exclusion principle. Which of the quantum numbers is it most concerned with?

5. Which ground state element corresponds to the following electron configurations?
   a. [Rn] $5f^{14}$ $6d^3$ $7s^2$

   b. [Ne] $3s^2$ $3p^4$

   c. [Xe] $4f^{14}$ $5d^6$ $6s^2$

   d. [Xe] $4f^{14}$ $5d^{10}$ $6s^1$

6. In your own words, what does Hund's rule state?

7.In which region of the periodic table do we find most of the exceptions to Aufbau for neutral, ground state elements? What about cations (positively charged ionic species)?

8. Write the electron configuration for silver. Try to give at least one example of an ion that would have an identical electron configuration.

9. Is the electron configuration for silver a violation of the Aufbau principle? Defend your assertion.

10. What one adjective describes the following species: Ar, P^{3-}, Cl^-, Ca^{2+}?

11. Arrange the following ions in order of increasing ionic radius

12. Define electron affinity in your own words and explain why electron affinity decreases from groups I to II.

13. Explain why a p orbital experiences more shield than an s orbital.

14. Calculate the effective nuclear charge for all of the electrons in nitrogen.

15. Explain why the first ionization energy decreases from group V to group VI elements (an exception to the trend of increasing ionization energy from left to right).

16. Rank the following elements in increasing atomic radius and explain the trend: Mg, Cs, F, Br

17. You travel to planet Darwin IV and discover that on this planet three electron spins exist. Which element would have a higher electron affinity, an element with atomic number 17 or an element with atomic number 26?

18. Where do you find metals in the periodic table? Which periodic trend dictates the location of metals on the periodic table?

19. Rank the following in order of increasing ionization energies: He, Ca, Sn, Sn^{+1}

20. As the effective nuclear charge increases right and up across the periodic table which trends also increase?