Unit 9 Problem Set

9.1) X $1s^2 2s^2 2p^6 3s^2 3p^3$

$\underline{1}\ \underline{1}\ \underline{1}$ three unpaired e^-

d. Ca_2X_3

9.2) c. S

9.3) d. Cs

9.4) b. S

9.5) b. C because in adding an e^- you get half-filled p orbitals. → Energetically stable.

9.6) b. Rb

9.7) b. As Same number of valence e^-

9.8) e. Sr

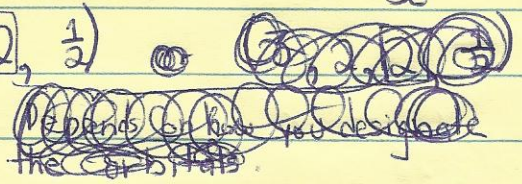
9.9) d. los gases nobles

9.10) b. Across a period (from left to right) protons are added to the nucleus ~~but e^-~~ increasing the nuclear charge but e^- are added to the same outer orbital not changing the overall e^- shielding. This increases

the effective nuclear charge. The same is not true in moving down a family of elements because the e^- are going into different outer orbitals thus changing the e^- shielding by the same amount as the increase in the nuclear charge.
∴ Zeff would remain roughly constant.

11) a. Sc [Ar] $4s^2 3d^1$ $\frac{\uparrow}{3d}$ Spin - up

$(3, 2, \boxed{-2}, \frac{1}{2})$



b. Si [Ne] $3s^2 3p^2$ $\frac{1\downarrow}{3s}$

$(3,0,0,\frac{1}{2})$ and $(3,0,0,-\frac{1}{2})$

c. F [He] $2s^2 2p^5$ $\frac{1\downarrow}{p_x}$ $\frac{1\downarrow}{2p}$ $\frac{1}{p_y}$ $\frac{1}{p_z}$

$p_x = -1$
$p_y = 0$
$p_z = 1$

$(2,1,1,\frac{1}{2})$

12) a. vanadium
b. cobalt
c. gallium
d. arsenic
e. sulfur

13) $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^2$

14) a. Ba : $6s^2$
b. B : $2s^2 2p^1$
c. Ca : $4s^2$
d. Ar : $3s^2 3p^6$

15) Only oxides of nonmetals.
b. S
d. Br
e. C

16) c. P because of its half-filled p orbital configuration. It is harder to remove this e^- relative to the one in S.

17) Fr < Rb < Ca < Li < Be

18) d. I

19) a. Mg Se

20) a. Sn^{4+}, Sn^{2+}
b. In^{3+}, In^{+}
c. The stability of the filled s-orbital