HW 8 & 9
CHEM 362

Available: April 14, 2008   Due: April 21, 2008

Chapter 10

1.   Why are alkali metals soft and volatile? Why are they called electropositive?

2.   What other ions have properties similar to alkali metals?

3.   What are alkali solutions in liquid ammonia called?

4.   Why is LiF almost insoluble in water whereas LiCl is soluble, not only in water, but in acetone?

5.   What is a crown ether? A cryptate?

6.   Anhydrous KOH in THF is one of the strongest known bases and will deprotonate exceedingly weak acids. Why? (Reactivity is related to salvation effects so consider the salvation of KOH by water versus THF).

7.   Complete and balance the equations for the following reactions:
        a. $KCl + Na \rightarrow$
        b. $Li + N_2 \rightarrow$
        c. $Na + O_2 \rightarrow$
        d. $Cs + O_2 \rightarrow$
        e. $K + C_2H_5OH \rightarrow$
        f. $RbO_2 + H_2O \rightarrow$
        g. $KOH + CO_2 \rightarrow$
        h. $C_4H_9Li + CH_3I \rightarrow$
        i. $K^+ + B(C_6H_5)_4 \rightarrow$

8.   Write out a Born –Haber cycle for the formation of KH.

Chapter 11

9.   Which compound, when dissolved in water, would give the most acidic solution, $BeCl_2$ or $CaCl_2$ and why?

10.   Draw the structures of $BeCl_2$ or $CaCl_2$ in the solid state.

11.   Why does linear X-Be-X exist only in the gas phase?

12.   What is an important point about Beryllium compounds from a safety point of view?

13.   Do the alkaline earth cations form many complexes? Which cations tend to do so and what are the best ligands (complexing agents)?

14.   Why do the alkaline earths have higher melting points than the alkali metals?

15.   Why does beryllium tend to form covalent compounds?

16. What are the main types of compounds formed by alkaline earth elements? Are they generally soluble in water?

17. Finish the equations for the following reactions:
    a. $BeCl_2 + Mg \rightarrow$
    b. $Be(s) + O_2 \rightarrow$ (with heat)
    c. $Be(s) + H_2O \rightarrow$

18. Why do you think that the coordination numbers for Be^{2+} and Mg^{2+} are four and six respectively?