## Chemistry 2500 Exam Three

Name

1. (48 points) Complete and balance each reaction shown below. Use smallest integer values possible for coefficients. Assume the requisite temperature for those that need it.

 $BCl_3(g) + H_2O(l) \rightarrow$  $H_3BO_3(s) + heat \rightarrow$  $B_2H_6(g) + O_2(g) \rightarrow$  $B_2H_6(g) + H_2O(l) \rightarrow$  $Li + CH_3I \rightarrow$  $Li_2O(s) + H_2O(l) \rightarrow$ Mg(s) + $ZrCl_4(s) \rightarrow$  $CaO(s) + C(s) \rightarrow$  $CaC_2(s) + N_2(g) \rightarrow$ Al(s) + $Fe_2O_3(s) \rightarrow$  $AlCl_3(s) +$  $LiH(s) \rightarrow$ Na(s) + $H_2O(1) \rightarrow$ Na(s) + $NH_3(g) \rightarrow$ NaHCO<sub>3</sub>(aq) + HC<sub>2</sub>H<sub>3</sub>O<sub>2</sub>(aq)  $\rightarrow$  $CH_4(g) + O_2(g) + NH_3(g) \rightarrow$  $SiO_2(s) + Li[AlH_4](s) \rightarrow$ 

2. (36 points) Fill in the attached periodic table with the appropriate atomic symbols through element number 36.

3. (8 points) Explain the basic steps in the production of Portland cement.

4. (8 points) Solid BeF<sub>2</sub> sublimes at ~ 800 °C. From this information, discuss the type of bonding you expect the compound to have.

Extra Credit (no more than 8 points) Beryllium is essentially transparent to X-rays but barium is opaque. Explain why.