CHM 1045 CH 6 Homework

1. Review Hess' Law, along with examples 6.07 and 6.08.
   Then, determine $\Delta H^{o}_{reaction}$ for $4C_{(graphite)} + 2O_{2(g)} \rightarrow 4CO_{(g)}$.
   First, manipulate the following reactions and enthalpies by applying factors.
   Write the complete results for each reaction and enthalpy after applying the factor.
   Then, add the two manipulated reactions and enthalpies together.
   Write the equation for the overall enthalpy change of the sum reaction.
   (2 pts)

   $C_{(graphite)} + O_{2(g)} \rightarrow CO_{2(g)}$ $\quad \Delta H^{o}_{reaction} = -393.5$ kJ
   $2CO_{(g)} + O_{2(g)} \rightarrow 2CO_{2(g)}$ $\quad \Delta H^{o}_{reaction} = -566.0$ kJ

2. $NH_{3(aq)}$ and $HNO_{3(aq)}$ react to form $NH_4NO_{3(aq)}$. Find $\Delta H^{o}_{reaction}$ using the Standard Enthalpies of Formation Table, and put it into the thermochemical equation. Start by writing the net ionic reaction, where the spectator ion (NO_3^{-1}) has been eliminated and $NH_{3(aq)}$ remains as a dissolved (undissociated) molecule. Include all phase subscripts. Then, write a complete summation equation for the net ionic reaction as in examples 6.09 and 6.10. (2 pts)

3. Review examples 6.03, 6.09, and 6.10.
   $N_{2(g)}$ reacts with $H_{2(g)}$ to form one (1) mole of $NH_{3(g)}$, gaseous ammonia.
   Aqueous ammonia, $NH_{3(aq)}$, reacts with aqueous acetic acid, $CH_3COOH_{(aq)}$,
   to form a solution of ammonium, $NH_4^{+1}{}_{(aq)}$, and acetate, $CH_3COO^{-1}{}_{(aq)}$.
   Write both balanced thermochemical equations based on **one (1) mole** of each product.
   Write the **complete summation equation** for each reaction, as in Examples 6.08 and 6.09.
   Include all of the coefficients and all of the ΔH^o_f values in your equations.
   Use this Standard Enthalpies of Formation Table to find the ΔH^o_f values, then determine ΔH^o for each reaction. Include all phase subscripts. Show all of your equations. (2 pts)

4. Review example 6.04. Determine the heat evolved (in kJ and in J) when 10.0 g of $NH_{3(g)}$ are created. Use the reaction in problem 3 to create the conversion factor from moles to J. Completely show **all** equations, units, and conversion factors. (2 pts)

5. Review example 6.05. Suppose that the 10.0 g of NH_3 from problem 4 is formed in a bomb calorimeter, and that all of the evolved heat for the exothermic reaction is completely absorbed by the surrounding 1.000×10^3 g of water. Find the change in temperature (ΔT), and the final temperature (T_F) of the water if it is initially at 20.00 ^oC. Note that the heat is negative for the reaction, but positive for the water in the calorimeter. Completely show **all** equations, units, and conversion factors. (2 pts)