HINTS TO HELP YOU COMPLETE THE ΔH ASSIGNMENT

1. The reactants (hydrogen and oxygen) and the product (water) are given to you in the question along with the coefficients (the number of moles are the coefficients). Simply write out the reaction and insert the energy value on the correct side of the arrow. The questions asks you to re-write out the reaction making one mole of water instead of the 2 moles in the original reaction. Simply divide everything (including the energy value) by 2!
2. The overall reaction is given to you. You must use the 2 equations given to you in one form or another so when they are added up, they yield the overall reaction. Keep "step" 1 as is since C_2H_4 is on the left side of the arrow for the overall reaction too! Incorporate the energy value into the reaction. "Step" 2 needs to be flipped. Be careful when including the energy term (it goes on the same side as carbon dioxide and water). Draw a line showing the two reactions are being added.
3. These are simple to do ... find the ΔHf° for all of the reactants/products and write these values underneath the formulas. Now write down Hess' law Σ ΔHf°products - Σ ΔHf°reactants, substitute (take into account the coefficients) and solve. Watch out, when including coefficients, the unit for ΔH is KJ!
4. Firstly, you need to write out the chemical reaction for the combustion of sucrose (reacting it with oxygen to produce carbon dioxide and steam). The question also gives you the overall ΔH for the entire reaction. Look up the ΔHf° for all of the reactants and products (except for sucrose which you are being asked to solve for). Use Hess' law and solve for the ΔHf° of sucrose!
5. This is a question similar to reaction 3 of your lab. Write out the reaction (balanced?) and set up the stoich columns. It is an exothermic reaction (temp went up) so you should know what side of the arrow to put the energy term. Put all calorimeter data under the energy term. Remember that the mass of the heat absorber is the TOTAL amount of LIQUID in the calorimeter. Solve for Qcal. Convert it to Qrx. You need to find the number of moles for nitric acid (n = CxV). Now find ΔH = Qrx/n of nitric acid. Since you divided by n, the units will be J/mol or kJ/mol of nitric acid depending whether or not you coverted m of the heat absorber. If it is in grams, units for ΔH are J/mol. kg? Units are kJ/mol.
6. The question gives you the reactants and products as well as the energy value. Write out the chemical reaction and include the energy term. The coefficient that you are to use for aluminum is given to you. Balance it accordingly. Now, you are asked to find out how much energy is needed for 4 moles (simply multiply everything by 4).
7. You are given a reaction; incorporate the energy term into the equation. You are asked to reaction of 10 mol of quick lime (CaO with water) so reverse the reaction and multiply EVERYTHING by 10 since the original reaction has CaO with a coefficient of 1).
8. You are given two steps and you must use them so that they add up to give you the overall reaction $2NO + O_2 \rightarrow N_2O_4$. You will need to flip step 1 since N_2O_4 is on the wrong side of the arrow. Be careful incorporating the energy value in (it goes with N_2O_4). Step 2 can be used as is.

Include the energy value. Draw a line to show the 2 reactions are being added and cross out things that are on both sides of the arrow. You should get the overall reaction.

9. Again, you are given the overall reaction and 2 "steps" that when added together, should yield the overall reaction. I would re-write the steps and include the energy values. Now, you will need to flip step 1 since KCl is on the wrong side of the arrow. Step 2 can be left as is (sulphuric acid is on the proper side of the arrow; as is potassium sulphate). Draw a line showing the 2 reactions are being added together and you should get the overall reaction once the chemicals that appear on both sides of the arrow are eliminated.
10. Same deal here. Re-write the steps and INCLUDE the energy values (it'll prevent silly mistakes if you have to flip a reaction). Step 1 needs to be flipped and divided by 2 since NaCl is on the wrong side of the arrow (compared to the overall reaction). In the overall reaction, NaCl has a coefficient of 1 (thus dividing by 2). Step 2 needs to be flipped and divided by 2 also. Step 4 needs to be flipped and divided by 2 (HNO_2 is on the wrong side of the arrow compared to the overall reaction). Step 3 is kept as is but divided by 2. That will help you cross out NO, NO_2, N_2O and O_2 which aren't in the overall reaction.
11. This is probably the hardest question on the assignment. You need to use the 5 "steps" given and ANY others you may need (that you have to make up) to get the overall reaction which would always be given to you in the question. So ... look for things that appear in any step AND in the overall reaction. Re-write steps with energy value included. That will give you a place to start. Flip step 3 since LiOH(aq) is on the wrong side of the reaction. You need to eliminate LiOH(s) (not in the overall reaction) so use step 1 ... flip it. Take step 4 and flip it to get HCl(aq) on the proper side of the arrow. You don't want HCl(g) and no step given has HCl(g) to help you cross it out. Make one up ... $\frac{1}{2} H_2 + \frac{1}{2} Cl_2 \rightarrow HCl(g)$ (look up energy value and include it). Step 5 can be used as it since LiCl(aq) is on the correct side of the arrow. You don't want LiCl(s), use step 2 as is and you'll be able to cross out LiCl(s). No step has water in it so you will have to make one up ... $H_2 + \frac{1}{2} O_2 \rightarrow H_2O$. Look up the energy value and include it. If you added up the 7 steps and cross out things on both sides of the arrow, you should get the overall reaction. Remember that $\frac{1}{2} H_2$ and $\frac{1}{2} H_2 = 1 H_2$ when crossing things out.
12. This question is easy. It is basically asking you to write out the standard heat of formation for the following compounds from its ELEMENTS. Look up the energy values and include them in the reactions. As an example, for sulphuric acid, $H_2 + S + 2O_2 \rightarrow H2SO_4$ + 813.8 kJ/mol. Yes, it is that easy!
13. Simply use Hess' law short form. Look up the ΔHf° for all of the reactants and products and write these values underneath their formulas. Write out the formula for Hess' law, substitute (take into account the coefficients) and solve for ΔH°.
14. Use Hess' law short form. Always make sure the overall reaction is balanced!!!! Now, look up the ΔHf° values and write them underneath their respective formulas. Write out Hess' law, substitute (take into account any coefficients) and solve.
15. Solve this question exactly like you did for #4. You are given the balanced (lucky!) chemical reaction for the combustion of glucose AND the overall ΔH for the reaction. Look up the ΔHf° values for oxygen, carbon dioxide and steam and write them down under the appropriate formulas. Use Hess' law short form and solve for the ΔHf° for glucose.

16. You are given 2 reactions that are to be used as “steps” to give you an overall reaction: formation of 1 mol of phosphoric acid from its elements. Keep both steps as is (include the energy values); draw a line to show that they are being added together. You should be the overall reaction BUT it will be for the formation of 4 mol of phosphoric acid. So you should divided the ENTIRE reaction by 4. You are done!
17. EASY ... use Hess’ law short form. Make sure the reaction is balanced. Nexst, look up all of the values for ΔHf° and write them underneath the appropriate formula. You should know what to do from there ... just incorporate the coefficients!!!!!