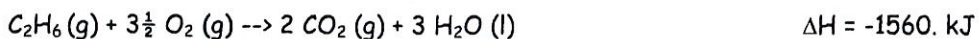
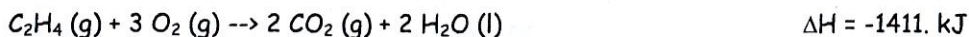
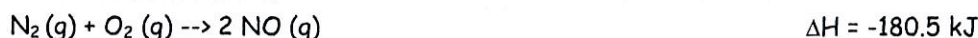


Hess's Law Worksheet

1. Calculate ΔH for the reaction: $C_2H_4(g) + H_2(g) \rightarrow C_2H_6(g)$, from the following Data.

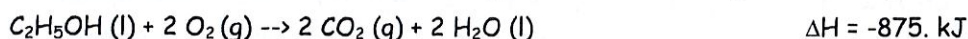


2. Calculate ΔH for the reaction $4 NH_3(g) + 5 O_2(g) \rightarrow 4 NO(g) + 6 H_2O(g)$, from the following Data.



3. Find

ΔH° for the reaction $2H_2(g) + 2C(s) + O_2(g) \rightarrow C_2H_5OH(l)$, using the following thermochemical data.

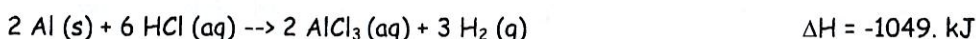


4. Calculate

ΔH for the reaction $CH_4(g) + NH_3(g) \rightarrow HCN(g) + 3 H_2(g)$, given:



5. Calculate ΔH for the reaction $2 Al(s) + 3 Cl_2(g) \rightarrow 2 AlCl_3(s)$ from the Data.



Use these charts as needed in the following calculations: You will need your own paper to complete your calculations.

<u>Substance</u>	<u>Specific Heat (J/g°C)</u>
H ₂ O (l)	4.184
H ₂ O (steam)	2.02
Al (s)	0.89
Fe (s)	0.45

<u>Water</u>
$\Delta H_{\text{fus}} = 334 \text{ J/g}$
$\Delta H_{\text{vap}} = 2260 \text{ J/g}$

8. How much heat is required to warm 275 g of water from 76 °C to 87 °C?
9. PCl₃ is a compound used to manufacture pesticides. A reaction requires that 96.7 g of PCl₃ be raised from 31.7 °C to 69.2°C. How much energy will this require given that the specific heat of PCl₃ is 0.874 J/g °C?
10. A quantity of water is heated from 25.0 °C to 36.4 °C by absorbing 325 J of heat energy. What is the mass of the water?
11. A 500. g sample of an unknown metal releases 6.4×10^2 J as it cools from 55.0 °C to 25.0 °C. What is the specific heat of the sample?
12. In a household radiator, 1000.g of steam at 100. °C condenses (changes from gas to liquid). How much heat is released?
13. How much heat is necessary to change a 52.0 g sample of water at 33.0°C into steam at 110.0 °C? This problem requires several steps since temperature changes and a phase change takes place. Use the hints to solve.
 - 1) Solve for the heat required to increase the water temperature from 33.0 °C to 100.0 °C. Stop here because the water will change phase at this temperature.
 - 2) Solve for the heat required to change the water into steam (no change in temp).
 - 3) Calculate the heat required to change the temperature of the steam from 100.0 °C to 110.0 °C.
 - 4) To get the heat required for the whole process, _____ the calculated heats from above.