Dougherty Valley HS Chemistry - AP
Thermochemistry – Practice Quiz

Worksheet #4

Name: **Period:** **Seat#:**

Directions: Show all work in a way that would earn you credit on the AP Test! This is always the rule! Some answers are provided at the end in italics and underlined. If you need more space, use binder paper and staple to your worksheet.

$$\boxed{\Delta H° = \Sigma\Delta H_f^\circ\, products - \Sigma\Delta H_f^\circ\, reactants}$$

1) Answer the following questions about the reaction of nitrogen gas and oxygen gas.

a) Calculate the amount of heat transferred when 10.00 g of $N_2O(g)$ is formed by the following reaction:
$2N_2(g) + O_2(g) \rightarrow 2N_2O(g)$ $\Delta H_{rxn} = +163.2$ kJ

18.54 kJ

b) Draw and label an energy diagram for this process.

2) Predict the (+) or (-) algebraic sign for ΔH_f° for the following scenarios and explain why:

a) $Br_2(g)$	**c)** $I_2(g)$
b) $Br_2(l)$	**d)** $I_2(s)$

3) Calculate the ΔH_{rxn}° for the following reaction:

$\mathbf{C_2H_4(g) + 3O_2(g) \rightarrow 2CO_2(g) + 2H_2O(\mathit{l})}$

ΔH_f° $C_2H_4(g)$ = 226.6 kJ/mol
ΔH_f° $CO_2(g)$ = -393.5 kJ/mol
ΔH_f° $H_2O(l)$ = -285.8 kJ/mol

-1585.2 kJ/mol

4) A 5.00 g sample of liquid water at 25.0°C is heated by the addition of 84.0 J of energy. Determine the final temperature of the water in °C? (The specific heat capacity of the liquid is 4.18 J/g°C).

29.0°C

5) Propane is a hydrocarbon that is commonly used as a fuel for cooking. Propane's formula is C_3H_8.

a) Write a balanced equation for the complete combustion of propane gas.

b) Calculate the volume of air at 30°C and 1.00 atm that is needed to burn completely 10.0 g of propane. Assume that air is 21.0% O_2 by volume.

134 L air

c) The heat of combustion ($\Delta H^\circ_{combustion}$) is -2,220.1 kJ/mol. Calculate the heat of formation, ΔH°_f, of propane given that ΔH°_f of H_2O(*l*) is -285.3 kJ/mol and ΔH°_f of CO_2(g) is -393.5 kJ/mol.

-101.6 kJ/mol

d) Assuming that all of the heat evolved burning 10.0 g propane is transferred to 8.00 kg of water (specific heat = 4.184 J/g°C), calculate the increase in temperature of the water.

15.0°C is ΔT