Dougherty Valley HS AP Chemistry
Thermochemistry – Practice Quiz

WORKSHEET #4

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

Show all work

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

[1]

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 an energy diagram for this process.

[2] Predict the value for ΔH_f° for the following scenarios and explain why:

a) $Br_2(g)$

b) $Br_2(l)$

c) $I_2(g)$

d) $I_2(s)$

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

$C_2H_4(g) + 3O_2(g) \rightarrow 2CO_2(g) + 2H_2O(l)$

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

-1584.2 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

[6] 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