CHM 1046 - JOENS WORKSHEET #6 Due date: Friday, October 5th

WORKSHEETS ARE DUE AT THE BEGINNING OF CLASS ON THE DATE GIVEN ON THE WORKSHEET. LATE WORKSHEETS WILL NOT BE ACCEPTED.

NOTE: EXAM 2 is **Wednesday, October 10th**. It will cover Chapter 15, and Sections 16.1, 16.3, 16.4, and 16.5 of Chapter 16. This includes the Chapter 16 ppt slides 1-31, and the Chapter 16 problems 1-10.

NAME _____ Panther ID _____

For problems involving calculations you must show your work for credit.

1) The equilibrium constant for the reaction

$$CO(g) + H_2O(g) \leftrightarrows CO_2(g) + H_2(g)$$

is $K_C = 5.10$ at T 700. K

A system initially has [CO] = 0.0500 M, [H_2O] = 0.1000 M, and [CO_2] = 0.0800 M. There is initially no H_2 in the system. What will be the concentrations of H_2O and H_2 in the system when equilibrium is reached?

2) Consider the following chemical reaction at T = 300. K

$PCl_5(g) \leftrightarrows PCl_3(g) + Cl_2(g)$ $\Delta H°_{rxn} = +87.9$ kJ/mol

A closed system containing all of the above substances is initially at equilibrium. Predict (by circling the correct answer) whether each of the following changes to the system will cause the moles of PCl_3 to increase, to decrease, or to stay the same.

Addition of 0.100 moles of Cl_2 to the system

moles PCl_3 will increase | moles PCl_3 will stay the same | moles PCl_3 will decrease

Increasing the volume of the system by 4.00 L, while keeping temperature constant

moles PCl_3 will increase | moles PCl_3 will stay the same | moles PCl_3 will decrease

Increasing the temperature of the system by 25.0 K

moles PCl_3 will increase | moles PCl_3 will stay the same | moles PCl_3 will decrease

3) Consider the following chemical reaction: $2\ NO(g) + O_2(g) \leftrightarrows 2\ NO_2(g)$

a) Write the expression for K (the thermodynamic equilibrium constant) for the above reaction.

b) Using the thermochemical data given below (at T = 25.0 °C) find the numerical value for K for the above reaction at T = 25.0 °C.

substance	$\Delta H°_f$ (kJ/mol)	$\Delta G°_f$ (kJ/mol)	$S°$ (J/mol•K)
NO(g)	90.25	86.55	210.76
$NO_2(g)$	33.18	51.31	240.06
$O_2(g)$	0.00	0.00	205.14