

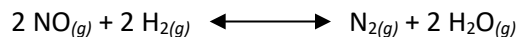
**Unit 7 – Chapter 13: Chemical Equilibrium**

Name \_\_\_\_\_

**Assignment #1: Equilibrium  $K_c$  and  $K_p$  Calculations**

Period \_\_\_\_\_

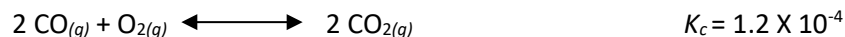
- 1) A mixture of 0.10 moles of NO, 0.050 moles of  $H_2$ , and 0.10 moles of  $H_2O$  is placed in a 1.0-liter vessel at 300 K. The following equilibrium is established:



At equilibrium,  $[NO] = 0.062 M$ .

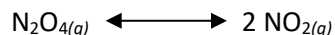
- Calculate the equilibrium concentrations of  $H_2$ ,  $N_2$ , and  $H_2O$ .
- Calculate  $K_c$ .

- 2) From the following equation:



Calculate the concentrations of all the species if 0.30 moles of CO and 0.30 moles of  $O_2$  are reacted in a 1.0-liter container.

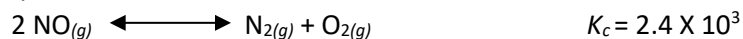
- 3) A flask is charged with 1.50 atm of  $N_2O_4$  and 1.00 atm  $NO_2$  at  $25^\circ C$ , and the following equilibrium is achieved:



After equilibrium is reached, the partial pressure of  $NO_2$  is 0.512 atm.

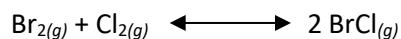
- What is the equilibrium partial pressure of  $N_2O_4$ ?
- Calculate the value of  $K_p$  for the reaction.

- 4) At 2000°C, the equilibrium constant for the reaction



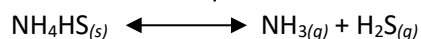
If the initial concentration of NO is 0.200 M, what are the equilibrium concentrations of NO, N<sub>2</sub> and O<sub>2</sub>?

- 5) For the equilibrium:



At 400 K,  $K_c = 7.0$ . If 0.30 mol of Br<sub>2</sub> and 0.30 mol Cl<sub>2</sub> are introduced into a 1.0 L container at 400 K, what will be the equilibrium concentrations of Br<sub>2</sub>, Cl<sub>2</sub>, and BrCl?

- 6) At 218°C,  $K_c = 1.2 \times 10^{-4}$  for the equilibrium:



Calculate the equilibrium concentrations of NH<sub>3</sub> and H<sub>2</sub>S if a sample of solid NH<sub>4</sub>HS is placed in a closed vessel and decomposes until equilibrium is reached.