OER 13.1-13.2

CHE 112 - Homework - Ch 13b
Using the Equilibrium Constant

Score: _____/30

Name: _____ Date: _____

[4 pt] 1. Calculate k_c for the following reaction $\_2\_ C_2H_4(g) + \_\_\_ O_2(g) \rightleftharpoons \_2\_ CH_3CHO(g)$. At equilibrium the concentration of each component is: $[C_2H_4] = 0.250$ M, $[O_2] = 0.750$ M, $[CH_3CHO] = 0.100$ M.

[4 pt] 2. The value of k_c for the reaction $\_3\_ O_2(g) \rightleftharpoons \_2\_ O_3(g)$ is 1.7×10^{-56} at 25 ℃.

(a) Does pure air contain more oxygen or ozone at equilibrium? Explain.

(b) If the equilibrium concentration of O_2 is 8.0×10^{-3} M, what is the equilibrium concentration of O_3?

[4 pt] 3. Given the reaction $\_\_\_ H_2O(g) + \_\_\_ CH_4(g) \rightleftharpoons \_\_\_ CO(g) + \_3\_ H_2(g)$ where $k_c = 4.7$ at 1400 K. If a mixture of reactants and products at 1400 K contains 0.035M H_2O, 0.050 M CH_4, 0.150 M CO, and 0.200 M H_2:

(a) Is the mixture at equilibrium? Explain.

(b) If the mixture is not at equilibrium, in which direction will the reaction proceed to reach equilibrium? Explain.

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[6 pt] 4. Given the reaction $\_\_\_N_2(g) + \_\_\_O_2(g) \rightleftharpoons \_2\_NO(g)$ with $k_c = 1.70 \times 10^{-3}$ at 2300 K, if the initial concentration are 1.40 M N_2 and 1.40 M O_2, what is the concentration of each compound N_2, O_2, NO when the mixture reaches equilibrium? Explain.

[6 pt] 5. At a certain temperature, the reaction $\_\_\_PCl_5(g) \rightleftharpoons \_\_\_PCl_3(g) + \_\_\_Cl_2(g)$ has an equilibrium constant $k_c = 5.8 \times 10^{-2}$. Calculate the equilibrium concentration of each compound if the initial concentration of $PCl_5 = 0.160$ M

[6 pt] 6. Given the reaction $\_\_\_HC_2H_3O_2(aq) + \_\_\_C_2H_5OH(aq) \rightleftharpoons \_\_\_CH_3COOC_2H_5(aq) + \_\_\_H_2O(aq)$ with $k_c = 1.4$ at 25 ℃, if the initial concentration are 1.00M $HC_2H_3O_2$ and 10.0 M C_2H_5OH, what is the concentration of each compound when the mixture reaches equilibrium? Explain.