**Name: Period: Seat#:**

**Worksheet #5**

**Directions:** Complete the following chart by choosing from the following options:
Equilibrium Shift: *left, right, no change ∆* [ ] / Temp: *increase, decrease, no change ∆* Keq: *no, yes*

**\_\_\_\_ N2 (g) + \_\_\_\_ H2 (g) ↔ \_\_\_\_NH3 (g) + 92.05 kJ**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Stressor** | **Equilibrium Shift** | **∆ [N2]** | **∆ [H2]** | **∆ [NH3]** | **∆ Temp** | **∆ Keq** |
| 1. Add N2
 | Right | *Slight* increase | Decrease | Increase | Increase | No |
| 1. Add H2
 |  |  |  |  |  |  |
| 1. Add NH3
 |  |  |  |  |  |  |
| 1. Remove N2
 |  |  |  |  |  |  |
| 1. Remove H2
 |  |  |  |  |  |  |
| 1. Remove NH3
 |  |  |  |  |  |  |
| 1. Increase Temp
 |  |  |  |  |  |  |
| 1. Decrease Temp
 |  |  |  |  |  |  |
| 1. Increase Pressure
 |  |  |  |  |  |  |
| 1. Decrease Pressure
 |  |  |  |  |  |  |
| 1. Write the equilibrium constant expression for Keq

POCl3 (g) ↔ POCl (g) + Cl2 (g) | 1. Write the equilibrium constant expression for Keq

2H2 (g) + O2 (g) ↔ 2H2O (g) |
| 1. Write the equilibrium constant expression for Keq

2C2H4 (g) + O2 (g) ↔ 2CH3CHO (g)  | 1. Write the equilibrium constant expression for Keq

2H2S (g) + 3O2 (g) ↔ 2H2O (g) + 2SO2 (g) |
| 1. Write the equilibrium constant Kc for the equation

2SO2 (g) + O2 (g) ↔ 2SO3 (g) | 1. Write the equilibrium constant Kc for the equation

CaCO3 (s) ↔ CaO (s) + O2 (g)  |
| 1. Write the equilibrium constant Kp for the equation

2SO2 (g) + O2 (g) ↔ 2SO3 (g) | 1. Write the equilibrium constant Kp for the equation

H2O (g) + C (s) ↔ H2 (g) + CO (g) |
| 1. The equilibrium constant expression for a gas reaction in Keq = $\frac{[NH\_{3}]^{4}[O\_{2}]^{5}}{[NO]^{4}[H\_{2}O]^{6}}$ Write the balanced chemical equation corresponding to this expression.
 |
| 1. The equilibrium constant expression for a gas reaction in Keq = $\frac{[CS2][H\_{2}]^{4}}{[CH\_{4}][H\_{2}S]^{2}}$ Write the balanced chemical equation corresponding to this expression.
 |
| 1. The equilibrium constant Keq for the equation 2HI (g) ↔ H2 (g) + I2 (g) at 425°C is 1.84. What is the value of Keq for the following equation: H2 (g) + I2 (g) ↔ 2HI (g)
 |
| 1. Consider the decomposition of nitrous oxide, also known as laughing gas. 2N2O (g) ↔ 2N2 (g) + O2 (g)

At 25°C the Kc is 7.3 x 1034* 1. Based on the information given, what can you say about the rate of decomposition of the reaction?

* 1. Based on the information given, does nitrous oxide have a tendency to decompose into nitrogen and oxygen, or does it have a tendency to stay as nitrous oxide? Justify your answer.
	2. You can convert back and for between Kc and Kp if you are given one of the values using the following equation: Kp = Kc(RT)∆n where R is the ideal gas constant (0.0821 L•atm/K•mol), T is temperature (in Kelvin), and ∆n is the change in number of moles of gaseous products compared to gaseous reactants ∆n = $Ʃ (moles of gaseous products)- Ʃ (moles of gaseous reactants)$ Using this information, and the information given at the start of the problem, calculate the value of Kp
 |
| 1. For the equilibrium system described by 2SO2 (g) + O2 (g) ↔ 2SO3(g) at a particular temperature the equilibrium concentrations of SO2, O2 and SO3 were 0.75 M, 0.30 M, and 0.15 M, respectively. At the temperature of the equilibrium mixture, calculate the equilibrium constant Keq for the reaction.
 |
| 1. For the equilibrium system described by: PCl5 (g) ↔ PCl3 (g) + Cl2 (g) Keq equals 35 at 487°C. If the concentrations of the PCl5 and PCl3 are 0.015 M and 0.78 M, respectively, what is the concentration of the Cl2?
 |
| 1. CO2 (g) + H2 (g) ↔ CO (g) + H2O (g)Calculate the value of the equilibrium constant, Kc, for the above system, if 0.1908 moles of CO2, 0.0908 moles of H2, 0.0092 moles of CO, and 0.0092 moles of H2O vapor were present in a 2.00 L reaction vessel at equilibrium. (Remember that M = mol/L)
 |
| 1. The following table gives some values for reactant and product equilibrium concentrations (in mol/L) at 700 K for the Shift Reaction, an important method for the commercial production of hydrogen gas. CO(g) + H2O (g) ↔ CO2 (g) + H2 (g)
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|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Trial** | **[CO2]** | **[H2]** | **[CO]** | **[H2O]** |
| 1 | 0.600 | 0.600 | 0.266 | 0.266 |
| 2 | 0.600 | 0.800 | 0.330 | 0.286 |
| 3 | 2.00 | 2.00 | 0.877 | 0.896 |
| 4 | 1.00 | 1.50 | 0.450 | 0.655 |
| 5 | 1.80 | 2.00 | 0.590 | 1.20 |

1. Calculate the Keq for each of the five trials.
 | * 1. Write the expression for calculating Keq for the reaction.
 |
| 1. How do the Keqs for each trial compare to each other? Why?
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