SCH4U1 Name:
ET06 Date:

Equilibrium Constant - Worksheet 1

1. Write the equilibrium expression for the following reactions:
   a. $wW + xX \rightleftharpoons uU + vV$
   b. $H_2O_{(g)} + CO_{(g)} \rightleftharpoons H_{2\,(g)} + CO_{2\,(g)}$
   c. $COCl_{2(g)} \rightleftharpoons CO_{(g)} + Cl_{2\,(g)}$
   d. $H_{2(g)} + Cl_{2\,(g)} \rightleftharpoons 2\,HCl_{(g)} + energy$
   e. $CO_{(g)} + NO_{2\,(g)} \rightleftharpoons NO_{(g)} + CO_{2\,(g)}$
   f. $Zn_{(s)} + 2\,Ag^{+}_{(aq)} \rightleftharpoons Zn^{2+}_{(aq)} + 2\,Ag_{(s)}$
   g. $C_2H_{6\,(g)} \rightleftharpoons H_{2\,(g)} + C_2H_{4\,(g)}$

2. Consider the following equilibrium reaction:

   $$H_{2(g)} + Br_{2\,(g)} \rightleftharpoons 2\,HBr_{(g)} + energy$$

   The K_{eq} for this reaction at 25℃ is 1.02. At equilibrium the concentration of HBr is 0.50mol/L. Assuming H_2 and Br_2 are present in equal amounts, calculate the concentration of H_2 at equilibrium.

3. Analysis of the following equilibrium reaction at 900℃ provides the concentrations listed below:

   $$H_2O_{(g)} + CO_{(g)} \rightleftharpoons H_{2\,(g)} + CO_{2\,(g)}$$

Experiment	[H_2O]	[CO]	[H_2]	[CO_2]
1	0.352	0.352	0.148	0.648
2	0.266	0.266	0.234	0.234
3	0.686	0.186	0.314	0.314

   Write the equilibrium expression for the reaction and calculate the value of the equilibrium constant for each experiment.

4. In the following reaction at 448℃, the equilibrium concentrations are HI = 0.0040M, H_2 = 0.0075M, I_2 = 0.000043M. Calculate the equilibrium constant given the reaction below:

   $$2\,HI_{(g)} \rightleftharpoons H_{2\,(g)} + I_{2\,(g)}$$

5. If the temperature of an exothermic reaction at equilibrium is lowered, is the value of K_{eq} increased or decreased?