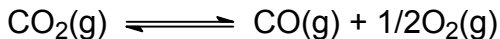
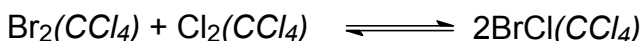


1. For the equilibrium



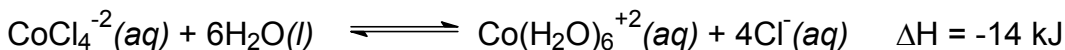
$$K_c = 1.72 \times 10^{-46} \text{ at } 25^\circ\text{C}.$$

- a) Evaluate K_p at 25°C . [**8.51 x 10⁻⁴⁶**]
b) If a flask initially containing only 1.00 atm of CO_2 is allowed to come to equilibrium, what will be the equilibrium pressure of each species?
[$P_{\text{CO}_2} = 1 \text{ atm}$; $P_{\text{CO}} = 1.1 \times 10^{-30}$; $P_{\text{O}_2} = 5.7 \times 10^{-31} \text{ atm}$]
c) Do you expect that this reaction will be exothermic or endothermic? Why? [**endo**]
2. Bromine and chlorine both dissolve in carbon tetrachloride, whereupon they react (slowly) to form BrCl :



Under equilibrium conditions at 25°C , $[\text{Br}_2] = [\text{Cl}_2] = 0.0043 \text{ M}$, and $[\text{BrCl}] = 0.0114 \text{ M}$.

- a) Evaluate the equilibrium constant for this reaction at 25°C . [**7.03**]
b) If 0.078 moles of BrCl were added to the equilibrium mixture above, what would be the new equilibrium concentrations of all species present? Assume 1 L of solution.
[$[\text{Br}_2] = [\text{Cl}_2] = 0.02107 \text{ M}$; $[\text{BrCl}] = .05586 \text{ M}$]
3. Predict the effect each of the following would have on the equilibrium reaction:

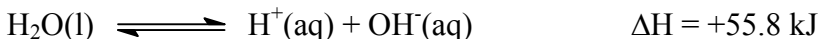


Indicate your choice by writing shift **R**ight, shift **L**eft, or **N**o change:

- a) Adding concentrated HCl _____
b) Heating the reaction _____
c) Adding AgNO_3 (AgCl is insoluble) _____
d) Adding water _____

[**L L R R**]

4. The ionization of water is an equilibrium process for which $K_c = 1.0 \times 10^{-14}$ at 25°C :



Determine the $[\text{H}^+]$ in water at 50°C . [**2.39 x 10⁻⁷**]

5. The normal boiling point of methanol is 64.65°C and its enthalpy of vaporization is 37.85 kJ/mol . What is its vapour pressure at 21.0°C ? [**102.8 mmHg**]