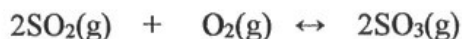
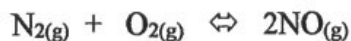


1. Answer the following questions about this reaction which takes place at 500 K:

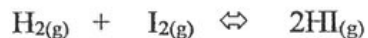


- a. Write the equilibrium expression for the reaction.
- b. Solve for the equilibrium constant,  $K$ , given the following equilibrium concentrations:  
 $[\text{SO}_2]_{\text{eq}} = 1.50$      $[\text{O}_2]_{\text{eq}} = 1.25$      $[\text{SO}_3]_{\text{eq}} = 3.50$
- c. What is the value of  $K_p$  for this reaction at 500 K?
- d. Based on the value of  $K$  determined in part b, what can one say about the spontaneity of the reaction?
- e. When the temperature of the reaction is lowered to 470 K, 16.5% of the  $\text{SO}_3$  is converted to reactants. Calculate the value of the equilibrium constant at 470 K.

2. The reaction between nitrogen and oxygen to form nitric oxide has a value for the equilibrium constant at 2000 K of  $K = 4.1 \times 10^{-4}$ . If 0.50 moles of  $\text{N}_2$  and 0.86 moles of  $\text{O}_2$  are put into a 2.00 L container at 2000 K, what will be the equilibrium concentration of all species?



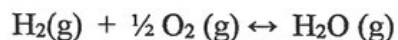
3. Examine the reaction between hydrogen gas and iodine gas.



If the initial concentrations are as follows, predict the direction that the reaction will shift in order to reach equilibrium. ( $K = 7.1 \times 10^2$  at 25 C)

$$[\text{H}_2] = 0.034 \text{ M}; [\text{I}_2] = 0.035 \text{ M}; [\text{HI}] = 1.50 \text{ M}$$

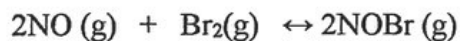
4. The value of  $K$  for the formation of water from its elements at 175°C is 0.25.



What is the value of  $K$  for the following reactions:



5. Nitric oxide and bromine at initial pressures of 98.4 and 41.3 torr, respectively, were allowed to react at 300 K. At equilibrium the total pressure was 110.5 torr. The reaction is



Calculate the value of  $K_p$ .