

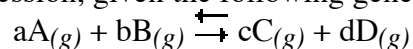
Name _____

Chemical Equilibrium

ch16

1. Define the term *chemical equilibrium*.

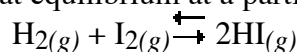
2. Write the equilibrium expression, given the following general equation.



Distinguish between the K_p and K_c for the reaction.

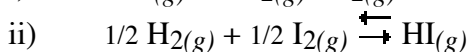
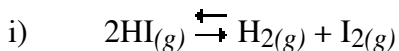
3a. Distinguish between the equilibrium constant and the equilibrium constant expression for a chemical reaction.

b. The following reaction is at equilibrium at a particular temperature

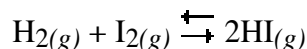


and the $[H_2]_{eq} = 0.012$ M, $[I_2]_{eq} = 0.15$ M and $[HI]_{eq} = 0.30$ M. Calculate the magnitude of K_c for the reaction.

c. Using the equilibrium constant calculated in b, calculate the magnitude of the equilibrium constant for the following reactions at the same temperature.

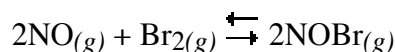


4. The initial concentration of both H_2 and I_2 is 0.250 M. The reaction occurs as shown below,

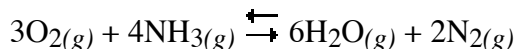


When equilibrium is achieved the concentration of HI is 0.393 M. Calculate the magnitude of K_c for the reaction.

5. A vessel initially has a partial pressure of NO equal to 0.526 atm and a partial pressure of Br_2 equal to 0.329 atm. At equilibrium the partial pressure of Br_2 is 0.203 atm. Calculate K_p for the reaction



6. Given the reaction

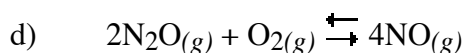
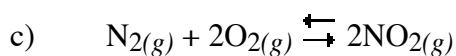
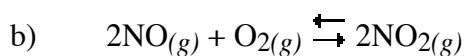
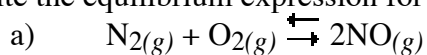


Initially (before any reaction occurs) a 1.00 liter reaction vessel at 400 °C contains 0.502 moles of O_2 and 0.791 moles of NH_3 and no water or nitrogen. Consider the following:

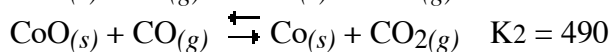
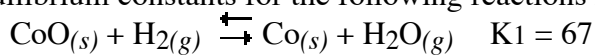
a) If 0.0873 moles of O_2 react, how many moles of NH_3 must react and how many moles of H_2O and N_2 are formed? How many moles of O_2 , NH_3 , H_2O and N_2 remain after completion of the reaction?

- b) If 0.234 moles of NH_3 react, how many moles of O_2 must react and how many moles of H_2O and N_2 are formed? How many moles of O_2 , NH_3 , H_2O and N_2 remain after completion of the reaction?
- c) If '3x' moles of O_2 react, how many moles of NH_3 must react and how many moles of H_2O and N_2 are formed (in terms of 'x')? How many moles of O_2 , NH_3 , H_2O and N_2 remain after completion of the reaction?
- d) If 0.875 moles of H_2O are formed, how many moles of N_2 are formed and how many moles of O_2 and NH_3 must react? How many moles of O_2 , NH_3 , H_2O and N_2 remain after completion of the reaction?

7. Write the equilibrium expression for each of the following chemical equations;



8. Equilibrium constants for the following reactions have been determined at 550 °C:



Calculate K (at the same temperature) for the commercially important water gas shift reaction

