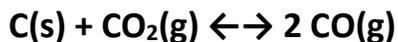


Equilibrium Practice

FRQ Practice



1. Solid carbon and carbon dioxide gas at 1,160 K were placed in a rigid 2.00 L container, and the reaction represented above occurred. As the reaction proceeded, the total pressure in the container was monitored. When equilibrium was reached, there was still some C(s) remaining in the container. Results are recorded in the table below.

Time (hours)	Total Pressure of Gases in Container at 1,160 K (atm)
0.0	5.00
2.0	6.26
4.0	7.09
6.0	7.75
8.0	8.37
10.0	8.37

- a. Write the expression for the equilibrium constant, K_p , for the reaction.
- b. Calculate the number of moles of $\text{CO}_2\text{(g)}$ initially placed in the container. (Assume that the volume of the solid carbon is negligible).
- c. For the reaction mixture at equilibrium at 1,160 K, the partial pressure of the $\text{CO}_2\text{(g)}$ is 1.63 atm. Calculate
- the partial pressure of CO(g) , and
 - the value of the equilibrium constant, K_p .

Finding Concentrations, Pressures

3. At 35°C, $K = 1.6 \times 10^{-5}$ for the reaction: $2 \text{NOCl}_{(g)} \rightleftharpoons 2 \text{NO}_{(g)} + \text{Cl}_{2(g)}$

Calculate the concentrations of all species at equilibrium for each of the following original mixtures:

a. 2.0 moles of pure NOCl in a 2.0-L flask

b. 1.0 mole of NOCl and 1.0 mole of NO in a 1.0-L flask

c. 2.0 moles of NOCl and 1.0 mole of Cl₂ in a 1.0-L flask

4. An initial mixture of nitrogen gas and hydrogen gas is reacted in a rigid 3.0-L container at a certain temperature by the reaction: $3 \text{H}_2 (\text{g}) + \text{N}_2 (\text{g}) \rightleftharpoons 2 \text{NH}_3 (\text{g})$
At equilibrium, 15.0 moles of H_2 , 24.0 moles of N_2 , and 12.0 moles of NH_3 were found to be present. What were the concentrations of nitrogen gas and hydrogen gas that were reacted initially?

5. At 80°C , $K_c = 1.87 \times 10^{-3}$ for the reaction: $\text{PH}_3\text{BCl}_3 (\text{s}) \rightleftharpoons \text{PH}_3 (\text{g}) + \text{BCl}_3 (\text{g})$
Calculate the equilibrium concentrations of PH_3 and BCl_3 if a solid sample of PH_3BCl_3 is placed in a closed vessel at 80°C and decomposes until equilibrium is reached.