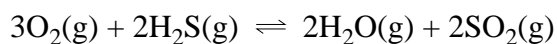


1. In the following system



in a 500 mL container, the initial number of moles were: O_2 0.50; H_2S 0.36; H_2O 0.68; SO_2 0.56. At equilibrium, there was 0.76 mole of H_2O . Calculate

- the number of moles of O_2 , H_2S and SO_2 at equilibrium,
 - the equilibrium concentration of all gases, and
 - K_c .
2. Starting with 0.85 g Fe and 1.00 g CO in a 3.0 L vessel, when the system $\text{Fe}(\text{s}) + 5\text{CO}(\text{g}) \rightleftharpoons \text{Fe}(\text{CO})_5(\text{g})$ reached equilibrium there was 0.64 g of Fe. Calculate K_c for the system.
3. For the equilibrium $\text{CO}_2(\text{g}) + \text{H}_2(\text{g}) \rightleftharpoons \text{CO}(\text{g}) + \text{H}_2\text{O}(\text{g})$, K_c is 0.080 at 400°C and 0.41 at 600°C. Is the forward reaction endothermic or exothermic? Explain.
4. For the equilibrium $2\text{SO}_2(\text{g}) + \text{O}_2(\text{g}) \rightleftharpoons 2\text{SO}_3(\text{g})$, ΔH for the forward reaction is negative.
- If the temperature is increased,
 - how will the system change? Explain in terms of what changes will occur in the concentrations of all gases;
 - will the value of K_c get larger or smaller? Explain.
 - If SO_2 is removed, how will the system change? Explain.
 - If SO_3 is removed, will the value of K_c change?
 - If SO_3 is added, will the SO_2 concentration increase or decrease? Explain.
5. Given the following equilibria
- $\text{CaCO}_3(\text{s}) \rightleftharpoons \text{CaO}(\text{s}) + \text{CO}_2(\text{g})$
 - $2\text{CO}_2(\text{g}) \rightleftharpoons 2\text{CO}(\text{g}) + \text{O}_2(\text{g})$
- if CaO is added to system (b) in equilibrium, will the concentration of CO increase or decrease? Explain.