

Non Sibi High School

Andover's Chem 550/580: Advanced Chemistry

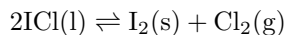
Chapter 15, Review Quiz 1

1

- a. Write the K_c and K_p expressions for the reaction $\frac{1}{2}\text{I}_2(\text{s}) + \frac{1}{2}\text{Cl}_2(\text{g}) \rightleftharpoons \text{ICl}(\text{l})$.
- b. If $K_c = 1.19 \times 10^3$ for this reaction, calculate the equilibrium molarity of chlorine gas.

2

For the reaction $\frac{1}{2}\text{I}_2(\text{s}) + \frac{1}{2}\text{Cl}_2(\text{g}) \rightleftharpoons \text{ICl}(\text{l})$, the value of $K_p = 241$. Calculate the value of K_p for the following reaction:



3

- a. Write the K_c expression for the reaction $2\text{Cr}(\text{s}) + 3\text{Ge}^{4+}(\text{aq}) \rightleftharpoons 2\text{Cr}^{3+}(\text{aq}) + 3\text{Ge}^{2+}(\text{aq})$.
- b. Solid chromium metal is added to a solution containing the initial concentrations 0.30 M Ge^{4+} , 0.86 M Cr^{3+} , and 0.73 M Ge^{2+} . When equilibrium is reached, the molarity of Cr^{3+} is found to be 0.68 M. Calculate the equilibrium molarity of Ge^{2+} and Ge^{4+} as well as K_c for the reaction.

4

For the reaction $2\text{CO}(\text{g}) + \text{O}_2(\text{g}) \rightleftharpoons 2\text{CO}_2(\text{g})$, $K_p = 7.7$. If a mixture initially contains 0.79 atm CO, 0.67 atm O_2 , and 0.21 atm CO_2 , calculate the equilibrium pressure of each gas and the total pressure at equilibrium.

5

a. Write the K_p expression for the decomposition of liquid bromine trifluoride to form bromine gas and fluorine gas:

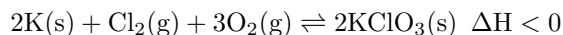


b. After a 0.85 gram sample of liquid bromine trifluoride was placed in a 225 mL container and heated to 75°C , the total pressure at equilibrium was found to be 0.68 atm. Calculate the equilibrium pressure of each gas and K_p for this reaction.

c. Calculate the mass of liquid bromine trifluoride present at equilibrium.

6

Consider the reaction:



a. State whether the amount of chlorine gas present at equilibrium will increase, decrease, or remain unchanged when each of the following occurs:

- i. Helium gas is added at constant volume.
- ii. Oxygen gas is removed.
- iii. The volume of the container is decreased.
- iv. The temperature is increased.
- v. Neon gas is added at constant pressure.
- vi. A catalyst is added.
- vii. Solid potassium metal is added.

b. Of the changes above, which will change the value of K_c and K_p , and will K_c and K_p increase or decrease?

7

If $K_p = 0.29$ at 35°C for the reaction $\text{NH}_4\text{HS}(\text{s}) \rightleftharpoons \text{H}_2\text{S}(\text{g}) + \text{NH}_3(\text{g})$, calculate K_c for the reaction at 35°C .

8

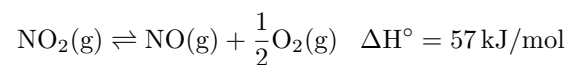
If $K_c = 3.65 \times 10^6$ at 425°C for the reaction $\text{O}_2(\text{g}) + 2\text{SO}_2(\text{g}) \rightleftharpoons 2\text{SO}_3(\text{g})$, calculate ΔG° for the reaction at 425°C .

9

If $\Delta G^\circ = 14.0 \text{ kJ/mol}$ at 45°C for the reaction $\text{PbCl}_2(\text{s}) \rightleftharpoons \text{Pb}^{2+}(\text{aq}) + 2\text{Cl}^-(\text{aq})$, calculate K_c for the reaction at 45°C .

10

Given that $K_p = 0.0094$ at 175°C for the reaction below, estimate K_p for the reaction at 222°C :



11

The normal boiling point of acetone is 56°C . If $\Delta H_{\text{vaporization}}^\circ = 31.2 \text{ kJ/mol}$ for acetone, estimate the vapor pressure of acetone in mmHg at 41°C .



This work is licensed under a
Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License
Contact: kcardozo@andover.edu