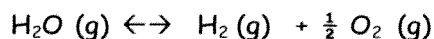


AP Chemistry Unit 4 Review Gases and Equilibrium

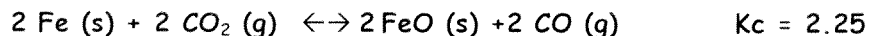
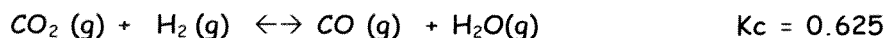
1. A gaseous mixture contains 4.29 g of methane, 1.25 g of ethane, and 5.24 g of propane. What pressure is exerted by the mixture inside a 50.0L cylinder at 75.0°C? Which gas contributes the greatest pressure and why?
2. To prepare a sample of hydrogen gas a student reacts zinc with hydrochloric acid. The overall net reaction is
$$\text{Zn (s)} + 2\text{H}^+ \text{(aq)} \rightarrow \text{Zn}^{2+} \text{(aq)} + \text{H}_2 \text{(g)}$$
 The hydrogen is collected over water at 26.0°C and the total pressure is 766.00 mmHg (vapor pressure of H₂O = 25.21 mmHg).
 - a. What is the partial pressure of the hydrogen?
 - b. How many grams of hydrogen are there in a 3.00 L sample of wet gas?
3.
$$4 \text{ KO}_2 \text{ (s)} + 2 \text{ CO}_2 \text{ (g)} \rightarrow 2 \text{ K}_2\text{CO}_3 \text{ (s)} + 3 \text{ O}_2 \text{ (g)}$$
 - a) If you combine 10.0 g of KO₂ with the CO₂ in a 2.00L tank, in which the gas pressure is 1.12 atm at 20.0 ° C, which reactant is consumed completely?
 - b) If the O₂ gas is captured from the reaction, what is its pressure in a 5.00 L flask at 27.0°C?
4. What is the rate at which He effuses compared to the rate at which CH₄ does?
5. What is the density of Ne gas if it is in a flask at 25.0 ° C and 2.00atm?
6. A mixture of SO₂, O₂, and SO₃ at 1000K contains the gases at the following concentrations: [SO₂] = 5.0*10⁻³M, [O₂] = 1.9*10⁻³M, [SO₃] = 6.9*10⁻³M. Which way will the reaction
$$2 \text{ SO}_2 \text{ (g)} + \text{O}_2 \text{ (g)} \leftrightarrow 2 \text{ SO}_3 \text{ (g)} \quad K_c = 279 \text{ at } 1000\text{K}$$
 shift to reach equilibrium? What is the value of the K_p at this Temperature?
7.
$$\text{CO}_2 \text{ (g)} + \text{H}_2 \text{ (g)} \leftrightarrow \text{CO (g)} + \text{H}_2\text{O(g)}$$
 Laboratory measurements at 986 °C show that there is 0.110mol each of CO and H₂O and 0.0870mol each of H₂ and CO₂ at equilibrium in a 1.0L container.
 - a. Calculate the K_c at this temperature.
 - b. Calculate the total pressure in the container at equilibrium.
 - c. If 0.100mol of H₂ and 0.100mol of CO₂ are added to the equilibrium mixture calculate the equilibrium concentrations for all gases after equilibrium is reestablished according to Lechatlier's Principle.

8. At a very high temperature, water vapor is 10.0% dissociated into H_2 and O_2 (that is 10% of the original water has been transformed into products and 90% remains.



- a. Assuming a $H_2O(g)$ concentration of 2.0M before dissociation, calculate the K_c .
b. Calculate the K_c for $4H_2(g) + 2O_2(g) \leftrightarrow 4H_2O(g)$
9. $2NO(g) + O_2(g) \leftrightarrow 2NO_2(g) + \text{heat}$ Predict the shift with these changes:
a. adding more O_2 b. removing NO c. increase T d. decreasing volume

10. Calculate K_c for the reaction $Fe(s) + H_2O(g) \leftrightarrow FeO(s) + H_2(g)$
given the following information:



11. The K_c value for the decomposition of solid NH_4HS is 1.8×10^{-4} at $25.0^\circ C$.



- a. When 1.0 mol of the solid is placed in a 1.0L flask it decomposes according to the equation above. What are the equilibrium concentrations of the two gases.
b. What is the total pressure at equilibrium?
c. What is the percent of NH_4HS decomposed when equilibrium is reached?
d. What is the percent of NH_4HS that remains?
12. What kind of conditions will allow a real gas to behave more like an ideal gas?