

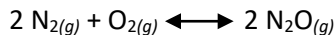
Unit 7 – Chapter 13: Chemical Equilibrium

Name _____

Assignment #2: Equilibrium Constant (K_c) & K_p Calculations

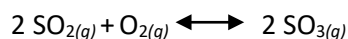
Period _____

- 1) At a particular temperature a 2.00-L flask at equilibrium contains 2.89×10^{-4} mol N_2 , 2.50×10^{-5} mol O_2 , and 2.00×10^{-2} mol N_2O . Calculate K_c at this temperature for the reaction



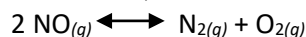
If $[N_2] = 2.00 \times 10^{-4} M$, $[N_2O] = 0.200 M$, and $[O_2] = 0.00245 M$, does this represent a system at equilibrium?

- 2) At 1100 K, $K_p = 0.25$ for the reaction



What is the value of K_c at this temperature?

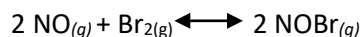
- 3) The equilibrium constant, K_p , is 2.4×10^3 at a certain temperature for the reaction



For which of the following sets of conditions is the system at equilibrium? For those that are not at equilibrium, in which direction will the system shift?

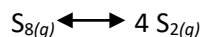
- $P_{NO} = 0.010$ atm, $P_{N_2} = 0.11$ atm, $P_{O_2} = 2.0$ atm
- $P_{NO} = 0.0078$ atm, $P_{N_2} = 0.36$ atm, $P_{O_2} = 0.67$ atm
- $P_{NO} = 0.0062$ atm, $P_{N_2} = 0.51$ atm, $P_{O_2} = 0.18$ atm

- 4) The reaction



has $K_p = 109$ at $25^\circ C$. If the equilibrium partial pressure of Br_2 is 0.0159 atm and the equilibrium partial pressure of $NOBr$ is 0.0768 atm, calculate the partial pressure of NO at equilibrium.

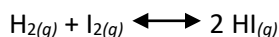
- 5) A sample of $S_{8(g)}$ is placed in an otherwise empty rigid container at 1325 K at an initial pressure of 1.00 atm, where it decomposes to $S_{2(g)}$ by the reaction



At equilibrium, the partial pressure of S_8 is 0.25 atm. Calculate the K_p for this reaction at 1325 K.

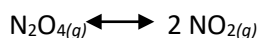
- 6) Nitrogen gas (N_2) reacts with hydrogen gas (H_2) to form ammonia (NH_3). At $200^\circ C$ in a closed container, 1.00 atm of nitrogen gas is mixed with 2.00 atm of hydrogen gas. At equilibrium, the total pressure is 2.00 atm. Calculate the partial pressure of hydrogen gas at equilibrium.

- 7) At a particular temperature, $K_c = 1.00 \times 10^2$ for the reaction



In an experiment, 1.00 mol H_2 , 1.00 mol I_2 , and 1.00 mol HI are introduced into a 1.00-L container. Calculate the concentrations of all species when equilibrium is reached.

- 8) At a particular temperature, $K_c = 4.0 \times 10^{-7}$ for the reaction



In an experiment, 1.0 mol N_2O_4 is placed in a 10.0-L vessel. Calculate the concentrations of N_2O_4 and NO_2 when this reaction reaches equilibrium.

- 9) Lexan is a plastic used to make compact discs, eyeglass lenses, and bullet-proof glass. One of the compounds used to make Lexan is phosgene ($COCl_2$), an extremely poisonous gas. Phosgene decomposes by the reaction



For which $K_p = 6.8 \times 10^{-9}$ at $100^\circ C$. If pure phosgene at an initial pressure of 1.0 atm decomposes, calculate the equilibrium pressures of all species.