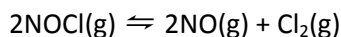
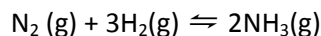


## Chemical Equilibrium

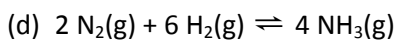
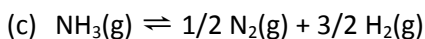
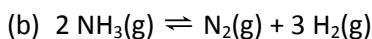
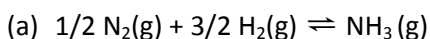
1. At a particular temperature, a 3.0-L flask contains 2.4 mol  $\text{Cl}_2$ , 1.0 mol  $\text{NOCl}$ , and  $4.5 \times 10^{-3}$  mol  $\text{NO}$ . Calculate  $K_c$  at this temperature for the following reaction:



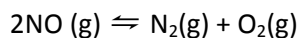
2. At a given temperature,  $K_c = 1.3 \times 10^{-2}$  for the reaction:



Calculate the values of  $K_c$  for the following reaction at the same temperature.



3. At a given temperature,  $K_c = 2.4 \times 10^3$  for the reaction:



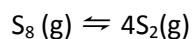
For which of the following sets of conditions is the system at equilibrium? For those that are not at equilibrium, in which direction will the reaction shift?

(a) A 1.0-L flask containing 0.024 mol  $\text{NO}$ , 2.0 mol  $\text{N}_2$ , and 2.6 mol  $\text{O}_2$ .

(b) A 2.0-L flask containing 0.032 mol  $\text{NO}$ , 0.62 mol  $\text{N}_2$ , and 4.0 mol  $\text{O}_2$ .

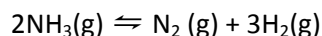
(c) A 3.0-L flask containing 0.060 mol  $\text{NO}$ , 2.4 mol  $\text{N}_2$ , and 1.7 mol  $\text{O}_2$ .

4. A sample of  $\text{S}_8(g)$  is placed in an empty rigid container at 1325 K at an initial pressure of 1.00 atm, where it decomposes to  $\text{S}_2(g)$  by the reaction



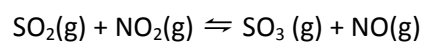
At equilibrium the partial pressure of  $\text{S}_8$  is 0.25 atm. Calculate  $K_p$  for this reaction at 1325 K.

5. At a certain temperature, 4.0 mol  $\text{NH}_3$  is introduced into a 2.0-L container, and the  $\text{NH}_3$  partially dissociates by the reaction:



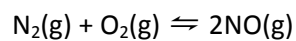
At equilibrium, 2.0 mol  $\text{NH}_3$  remains. What is the value of  $K_c$  for this reaction?

6. At a certain temperature,  $K_c = 3.75$  for the reaction:



If all four gases had initial concentrations of  $0.800\text{ M}$ , calculate the equilibrium concentrations of the gases.

7. At  $2200^\circ\text{C}$ ,  $K_p = 0.050$  for the reaction:



What is the partial pressure of the NO gas in equilibrium with  $\text{N}_2$  and  $\text{O}_2$  gases that were placed in a flask at initial pressures of  $0.80$  and  $0.20\text{ atm}$ , respectively?