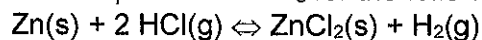


1. Write the equilibrium expression for
- K_c
- for the following rxn:



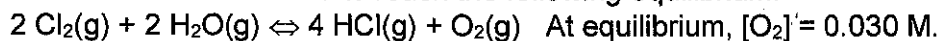
$$K = \frac{[\text{H}_2]}{[\text{HCl}]^2}$$

2. For the rxn
- $2 \text{A(g)} + \text{B(g)} \rightleftharpoons \text{AB}_2\text{(g)}$
- , the concentrations at equilibrium are:

$[\text{A}] = 0.10 \text{ M}$; $[\text{B}] = 0.20 \text{ M}$; $[\text{AB}_2] = 0.050 \text{ M}$. Calculate the value of K_c .

$$K = \frac{[\text{AB}_2]}{[\text{A}]^2 [\text{B}]} = \frac{.05}{(.1)^2 (.2)} = 25$$

3. 0.020 mol of
- Cl_2
- , 0.020 mol of
- H_2O
- , 0.060 mol of
- HCl
- , and 0.040 mol of
- O_2
- are added to a 1.0 L container and are allowed to reach the following equilibrium:



a) calculate $[\text{Cl}_2]$, $[\text{H}_2\text{O}]$, and $[\text{HCl}]$ at equilibrium; b) calculate the value of K_c .

.0018

	$2 \text{Cl}_2 + 2 \text{H}_2\text{O} \rightleftharpoons 4 \text{HCl} + \text{O}_2$			
I	.02	.02	.06	.04
C	+.02	+.02	-.04	-.01
E	.04	.04	.02	.03

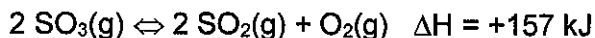
$$K = \frac{[\text{HCl}]^4 [\text{O}_2]}{[\text{Cl}_2]^2 [\text{H}_2\text{O}]^2} = \frac{(0.02)^4 (.03)}{(0.04)^2 (0.04)^2} = .001$$

4. For the rxn:
- $\text{PCl}_5\text{(g)} \rightleftharpoons \text{PCl}_3\text{(g)} + \text{Cl}_2\text{(g)}$
- ,
- $K_c = .497$

1.66 mol of PCl_5 is put into an empty 1.0 L container. What are the concentrations of PCl_5 , PCl_3 , and Cl_2 at equilibrium?

skip

5. Answer the following questions using the equilibrium rxn:

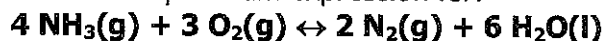


- a) If you increase $[\text{SO}_2]$, what happens to $[\text{SO}_3]$? $\uparrow$
- b) If you decrease $[\text{O}_2]$, what happens to $[\text{SO}_2]$? $\uparrow$
- c) If you increase the pressure, what happens to $[\text{SO}_3]$? $\uparrow$
- d) If you increase the temperature, what happens to $[\text{SO}_3]$? $\downarrow$
- e) In which of the above situations will the value of K_c change?

temp (d)

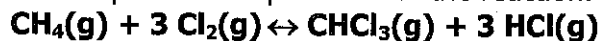
Equilibrium Practice

1. Write the equilibrium expression for:



$$K = \frac{[\text{N}_2]^2}{[\text{NH}_3]^4 [\text{O}_2]^3}$$

2. Write the equilibrium expression for the reaction:



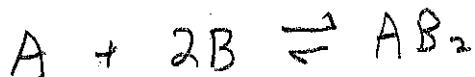
$$K = \frac{[\text{CHCl}_3][\text{HCl}]^3}{[\text{CH}_4][\text{Cl}_2]^3}$$

3. Using the equation in #2, the following were the concentrations at equilibrium.

Calculate the value of K. $[\text{CH}_4] = 3.0 \text{ M}$; $[\text{Cl}_2] = 1.0 \text{ M}$; $[\text{CHCl}_3] = 5.0 \text{ M}$; $[\text{HCl}] = 2.0 \text{ M}$

$$K = \frac{(5)(2)^3}{(3)(1)^3} = 13.3$$

4. Use the following reaction: $\text{A}(\text{g}) + 2 \text{B}(\text{g}) \leftrightarrow \text{AB}_2(\text{g})$; 1.0 moles of A, 1.0 moles of B, and 2.0 moles of AB_2 are placed in a 1.0 L container and allowed to reach equilibrium. At equilibrium, $[\text{A}]_{\text{eq}} = 0.70 \text{ M}$. Set up an ICE table and calculate the value of K.

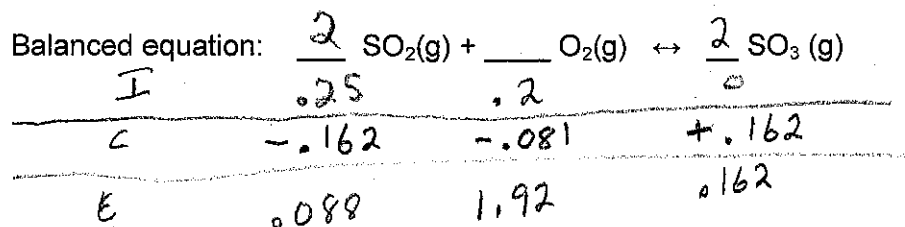


1.0	1.0	2.0
- .3	- .6	+ .3
.7	.4	1.7

$$K = \frac{[\text{AB}_2]}{[\text{A}][\text{B}]^2} = \frac{1.7}{(.7)(.4)^2} = 15.2$$

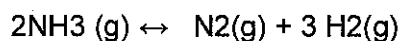
Equilibrium Practice

5. In a ~~40.0 L~~ vessel at 1000K, 0.250 mol $\text{SO}_2(\text{g})$ and 0.200 mol $\text{O}_2(\text{g})$ react to form 0.162 mol $\text{SO}_3(\text{g})$ at equilibrium. What is the K_c at 1000K for this reaction?

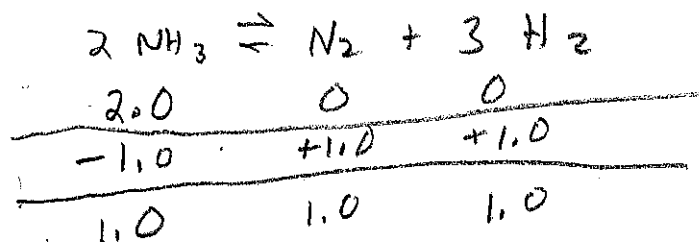


$$K = \frac{[\text{SO}_3]^2}{[\text{SO}_2]^2 [\text{O}_2]} = \frac{(0.162)^2}{(0.088)^2 (1.92)} = 1.77$$

6. At a certain temperature, 2.0 mole NH_3 is introduced into a 2.0-L container, and the NH_3 partially dissociates into by the following reaction:



At equilibrium, 1.0 mol NH_3 remains, what is the value of K for this reaction?



$$K = \frac{[\text{N}_2][\text{H}_2]^3}{[\text{NH}_3]^2} = \frac{(1)(1)^3}{(1)^2} = 1$$