

Chem 1515.001 – 1515.006
InClass Exercise #5
Week of October 29, 2001
Fall 2001

Name _____
TA Name _____
Lab Section # _____

ALL work must be shown to receive full credit. **Due at the end of laboratory.**

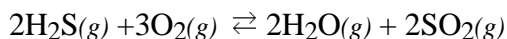
ICE5.1. The reaction



was studied at 760 °C. 0.200 mol of PCl_5 are placed in a 1.00 liter container and allowed to decompose. After equilibrium was established the concentration of PCl_3 was found to be 0.195 M. Calculate the equilibrium constant for the reaction at this temperature.

Answer: $K_c = 7.6$

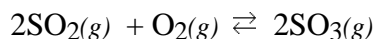
ICE5.2. The reaction



has a $\Delta H = -1036$ kJ. Given the reaction is at equilibrium, predict the direction (L \rightarrow R, R \rightarrow L, or no change) the reaction will shift when disrupted by each of the following;

- i) the amount of H_2O is increased
R \rightarrow L
- ii) the temperature of the reaction is increased
R \rightarrow L
- iii) the volume of the container is decreased
L \rightarrow R
- iv) the amount of H_2S is decreased
R \rightarrow L

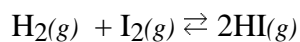
ICE5.3. At 1100 K 1.00 mol of SO₂ and 2.00 moles of O₂ are introduced into a 1.00 liter container and allowed to react according to the reaction,



At equilibrium the concentration of SO₂ is 0.188 M. Calculate K_c for the reaction.

Answer: K_c = 11.7

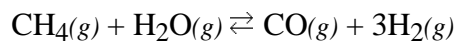
ICE5.4. The magnitude of the equilibrium constant for the reaction,



is 54.7 at 700 K. If the initial partial pressure of H₂ is 0.250 atm and the partial pressure of I₂ is 0.500 atm at 700 K, calculate the concentrations of all species when the reaction reaches equilibrium.

Answer: [H₂] = 0.015 atm, [I₂] = 0.265 atm, [HI] = 0.470 atm

ICE5.5. Consider the reaction



for which $\Delta H_{\text{rxn}} = +206 \text{ kJ}$. Assume a 1.00 L vessel containing an equilibrium mixture, predict how the $[\text{CH}_4]$ will change when the equilibrium is disturbed by,

a) addition of H_2O

$[\text{CH}_4]$ will decrease

b) addition of H_2

$[\text{CH}_4]$ will increase

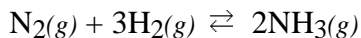
c) increase in temperature

$[\text{CH}_4]$ will decrease

d) decrease in the volume of the reaction container

$[\text{CH}_4]$ will increase

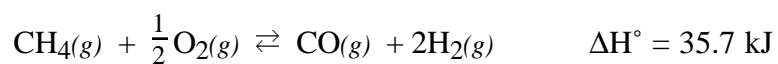
ICE5.6. At 200 °C, 0.500 mol of H_2 , 0.500 mol of N_2 and 0.500 mol of NH_3 are introduced into a 1.00 liter container and allowed to react according to the equation,



At equilibrium the concentration of NH_3 is 0.384 M. Calculate K_c for the reaction.

Answer: $K_c = 0.863$

ICE5.7. What conditions of temperature and pressure favor the formation of products in the reaction,



- A) **high temperature and low pressure.**
- B) high temperature and high pressure
- C) low temperature and low pressure
- D) low temperature and high pressure