

Chemistry 116 - Fall 2021  
Dr. Audrey Dell Hammerich  
**10 - Week of October 24**  
Chemical Equilibrium I

**NOTE:** Monday, October 25 is the second midterm exam covering everything since the first exam: Chapters 13, 5, 16.1-16.2, 16.10-16.11, and 17 (sections omitted appear on lecture slides).

**NOTE:** Since the end of this week is the last time that you are able to drop the course, we intend to grade the exam on Tuesday, and have grade estimates on Blackboard for Wednesday. All grades in the course, the curve, and what the grade estimates mean will be gone over on Wednesday during lecture.

**NOTE:** Remember that this week has no scheduled lab periods. Instead the normal lab periods are to be used to make-up any past lab.

**LAB ASSIGNMENT:** No scheduled labs. Lab period used for lab make-up.

**LECTURE ASSIGNMENT:** Online OWL assigned homework due on Monday, November 1 at noon except "W" problems are due Friday, October 29 at noon.

**Monday, October 25**

**Exam II**

**Wednesday, October 27**

Reading Assignment: Z Ch 6.1 - 6.5, H 8-2 [know how to write and calculate an **equilibrium constant** for a given reaction including **heterogeneous equilibria**; understand the **law of mass action**; know what happens to an equilibrium constant if you multiply the reaction by a factor  $n$ , write the reaction in reverse, add reactions together; be able to convert between  $K$  and  $K_p$  for a gas phase reaction]

**Friday, October 29**

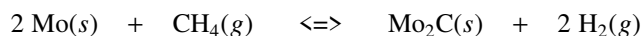
Reading Assignment: Z Ch 6.4, 6.6 - 6-7, 6.9, H 8-2 [know what a reaction quotient is and how to use it; be able to solve equilibrium problems - when to use the **quadratic formula**, how to treat a system which has a small equilibrium constant; be able to properly write equilibrium constants using **activities**]



7. Complete the following table of changes.

	$4 \text{ NH}_3(g)$	+	$7 \text{ O}_2(g)$	$\rightleftharpoons$	$4 \text{ NO}_2(g)$	+	$6 \text{ H}_2\text{O}(g)$
<b>Initial</b>	0.30 atm		0.70 atm		0		0
<b>Change</b>							
<b>Equilibrium</b>							

8. Solid molybdenum is placed in contact with gaseous  $\text{CH}_4$  at a pressure of 0.68 atm in a sealed empty reaction vessel at 300 K. After equilibrium is reached the total pressure in the container is 1.13 atm.

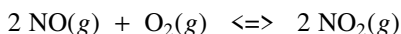


a) What is the equilibrium pressure of  $\text{H}_2$ ? [0.90 atm]

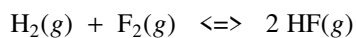
b) Write the expression for  $K_p$ .

c) Determine the numerical value of  $K_c$ . [0.14]

9. Determine  $K_p$  if the initial partial pressures are:  $P_{\text{NO}} = 0.70$  and  $P_{\text{O}_2} = 0.55$  atm and, when equilibrium has been reached,  $P_{\text{NO}_2} = 0.20$  atm for: [0.36]



10. The following reaction was run in a 3.00 L vessel at a temperature where  $K = 115$ :



a) If 6.00 mol of all three components were initially added what are their equilibrium concentrations?  
 $[\text{H}_2] = [\text{F}_2] = 0.47 \text{ M}$ ,  $[\text{HF}] = 5.06 \text{ M}$

b) If 3.00 mol of  $\text{H}_2$  and 6.00 mol of  $\text{F}_2$  were initially added what are all the equilibrium concentrations?  
 $[\text{H}_2] = 0.03 \text{ M}$ ,  $[\text{F}_2] = 1.03 \text{ M}$ ,  $[\text{HF}] = 1.94 \text{ M}$