Chem 115 - Section 1
Spring, 2007
Assignment 6

Reading Assignment

As noted in previous assignments, read all of Chapters 15 and 16.

Test 2

The second test will be given during regular class time on Wednesday, April 11. It will cover material corresponding to Chapter 14 (except the integrated rate law and half-life of second-order reactions, pp. 589-590) and Chapter 15.

Homework Assignment

The following homework problems will be covered in discussions during the week of March 26th, following the Spring Break. Begin by doing the following problems dealing with material in Chapter 14 (Kinetics), and then proceed to the problems from the book on Chapter 15. Worked-out solutions to the Extra Chapter 14 Problems have been posted on the web site under Solutions.

Chapter 14, Extra Problem 1. The radioactive isotope ^{54}V decays by beta emission with a half-life of 55 s. (a) What fraction of a sample of ^{54}V will remain after 220 s? (b) What fraction will remain after 75 s?

Chapter 14, Extra Problem 2. Consider the hypothetical reaction $A_2(g) + 2B(g) + 2C_2(g) \rightarrow 2AC(g) + 2BC(g)$ for which the following kinetic data have been collected.

Exp.	$[A_2]$, mol/L	[B], mol/L	$[C_2]$, mol/L	Rate, mol/L·s
1	0.120	0.240	0.120	3.62×10^{-4}
2	0.480	0.240	0.120	7.24×10^{-4}
3	0.480	0.240	0.360	7.24×10^{-4}
4	0.480	0.120	0.240	3.62×10^{-4}

(a) Determine the rate law expression for the reaction. (b) Calculate the value of the rate constant, *k*, with the proper units.

Chapter 14, Extra Problem 3: Consider the hypothetical reaction $A_2(g) + 2B(g) + 2C_2(g) \rightarrow 2AC(g) + 2BC(g)$ for which the experimentally determined rate law has been found to be *Rate* = $k[A_2]^{1/2}$ [B]. The following two mechanisms have been proposed for this reaction.

Mechanism I:

$A_2 \rightleftharpoons 2A$	fast equilibrium
$A + B \rightleftharpoons AB$	fast equilibrium
$AB + C_2 \rightarrow AC + BC$	slow

Mechanism II:

$A_2 \rightleftharpoons 2A$	fast equilibrium
$A + B \rightarrow AB$	slow
$AB + C_2 \rightarrow AC + BC$	fast

(a) Show that both proposed mechanisms are consistent with the overall stoichiometry of the reaction, $A_2(g) + 2B(g) + 2C_2(g) \rightarrow 2AC(g) + 2BC(g)$.

(b) What species are reaction intermediates in each mechanism?

(c) Derive the rate law expression for each mechanism in terms of observable reactant species (A_2, B, and C_2). On the basis of your rate law expressions, which mechanism is more plausible?

Chapter 15 Problems: 15.9, 15.11, 15.13, 15.15, 15.17, 15.19, 15.21, 15.23, 15.27, 15.29, 15.31, 15.33.