CHM 1046 - JOENS WORKSHEET #13 Due date: NONE

FINAL EXAM	U02(M,W,F)	Wednesday, December 7, 9:45m to 11:45am, PG5-155
	U03(T,R)	Thursday, December 8, 7:15pm to 9:15pm, PG6-116

For problems involving calculations you must show your work for credit. Unless otherwise stated, you may assume T = 25.0 °C.

1) For the irreversible chemical reaction

$$2\ H_2(g) + O_2(g) \rightarrow 2\ H_2O(g)$$

the following data were found.

time (min)	$[H_2]$	$[O_2]$	$[H_2O]$
0.0	0.0805	0.0418	0.0000
10.0	0.0781	0.0406	0.0024
20.0	0.0757	0.0394	0.0048
30.0	0.0733	0.0382	0.0071
40.0	0.0711	0.0371	0.0095

Find the average rate of reaction between 20.0 min and 30.0 min. Do this by using the data for H_2, for O_2, and for H_2O, and show that you get the same result for all of these (to within experimental error).

2) A particular irreversible chemical reaction obeys the rate law

$$\text{rate} = k\,[A]^2\,[B]$$

The reaction is

a) first order homogeneous
b) second order homogeneous
c) third order homogeneous
d) second order heterogeneous
e) third order heterogeneous

3) For a particular irreversible chemical reaction the initial concentration of A is $[A]_0 = 4.38 \times 10^{-4}$ M. After 20.0 s, the concentration drops to $[A] = 3.81 \times 10^{-4}$ M. Assuming the reaction is first order homogeneous (rate = k [A]) find the numerical value for k (including correct units) and the half-life ($t_{1/2}$).

4) A particular chemical reaction obeys the rate law

$$\text{rate} = k [A]^m [B]^n [C]^p$$

The initial rate of reaction is measured for a variety of initial conditions, and the data are given below. Based on this information, find the values for m, n, p, and k (including correct units).

experiment	[A] (mol/L)	[B] (mol/L)	[C] (mol/L)	initial rate (mol/L•s)
1	0.0200	0.0200	0.0100	0.60×10^{-7}
2	0.0200	0.0200	0.0200	1.23×10^{-7}
3	0.0200	0.0400	0.0100	2.37×10^{-7}
4	0.0500	0.0200	0.0200	1.32×10^{-7}