

# KINETICS Practice Problems and Solutions

Name: \_\_\_\_\_  
 Period: \_\_\_\_\_ Date: \_\_\_\_\_

AP Chemistry  
 Dr. Mandes

The following questions represent potential types of quiz questions. Please answer each question completely and thoroughly. The solutions will be posted on-line on Monday.

5. Please do #18 in chapter 12 of your text.
- This increases the  $[H_2]$ , which will increase the rate, but has no effect on  $k$
  - Due to Arrhenius equation, changing temperature changes the value of  $k$ .
  - Catalyst function by lowering the activation energy, so due to Arrhenius equation, changing the activation energy changes the value of  $k$ .

6. Consider the reaction:  $P_4 + 6 H_2 \rightarrow 4 PH_3$ . A rate study of this reaction was conducted at 298 K. The data that were obtained are shown in the table.

$[P_4]$ , mol/L	$[H_2]$ , mol/L	Initial Rate, mol/L · s
0.0110	0.0075	$3.20 \times 10^{-4}$
0.0110	0.0150	$6.40 \times 10^{-4}$
0.0220	0.0150	$6.39 \times 10^{-4}$

- What is the order with respect to:  $P_4$  0  
 $H_2$  1
- Write the rate law for this reaction.  $rate = k[H_2]$
- Determine the value and units of the rate constant,  $k$ . **plug and chug using the rate law & data from exp't 1 and solving for  $k$ , we get  $k = 0.0427 s^{-1}$**

7. Consider the reaction:  $SO_2 + O_3 \rightarrow SO_3 + O_2$ . A rate study of this reaction was conducted at 298 K. The data that were obtained are shown in the table.

$[SO_2]$ , mol/L	$[O_3]$ , mol/L	Initial Rate, mol/L · s
0.25	0.40	0.118
0.25	0.20	0.118
0.75	0.20	1.062

- What is the order with respect to:  $SO_2$  2  
 $O_3$  0
- Write the rate law for this reaction.  $rate = k[SO_2]^2[O_3]^0$
- Determine the value and units of the rate constant,  $k$ . **plug and chug using the rate law & data from exp't 1 and solving for  $k$ , we get  $k = 2.36 molL^{-2} s^{-1}$**

8. Consider the following mechanism.
- $$A_2 + B_2 \rightarrow R + C \quad (\text{slow})$$
- $$A_2 + R \rightarrow C \quad (\text{fast})$$

- Write the overall balanced chemical equation.  $2 A_2 + B_2 \rightarrow 2 C$
- Identify any intermediates within the mechanism. **R**
- What is the order with respect to each reactant?  **$A_2$  1<sup>st</sup>;  $B_2$  1<sup>st</sup>**

# Kinetics Problems And Solutions

**S Baum**



## **Kinetics Problems And Solutions:**

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