

# 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 $\cdot$ 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 $\cdot$ 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>**

# Chemical Kinetics Practice Problems And Solutions

**Yi-Tong Ma**



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## **Table of Contents Chemical Kinetics Practice Problems And Solutions**

1. Understanding the eBook Chemical Kinetics Practice Problems And Solutions
  - The Rise of Digital Reading Chemical Kinetics Practice Problems And Solutions
  - Advantages of eBooks Over Traditional Books
2. Identifying Chemical Kinetics Practice Problems And Solutions
  - Exploring Different Genres
  - Considering Fiction vs. Non-Fiction
  - Determining Your Reading Goals
3. Choosing the Right eBook Platform
  - Popular eBook Platforms
  - Features to Look for in an Chemical Kinetics Practice Problems And Solutions
  - User-Friendly Interface
4. Exploring eBook Recommendations from Chemical Kinetics Practice Problems And Solutions
  - Personalized Recommendations

- Chemical Kinetics Practice Problems And Solutions User Reviews and Ratings
- Chemical Kinetics Practice Problems And Solutions and Bestseller Lists
- 5. Accessing Chemical Kinetics Practice Problems And Solutions Free and Paid eBooks
  - Chemical Kinetics Practice Problems And Solutions Public Domain eBooks
  - Chemical Kinetics Practice Problems And Solutions eBook Subscription Services
  - Chemical Kinetics Practice Problems And Solutions Budget-Friendly Options
- 6. Navigating Chemical Kinetics Practice Problems And Solutions eBook Formats
  - ePub, PDF, MOBI, and More
  - Chemical Kinetics Practice Problems And Solutions Compatibility with Devices
  - Chemical Kinetics Practice Problems And Solutions Enhanced eBook Features
- 7. Enhancing Your Reading Experience
  - Adjustable Fonts and Text Sizes of Chemical Kinetics Practice Problems And Solutions
  - Highlighting and Note-Taking Chemical Kinetics Practice Problems And Solutions
  - Interactive Elements Chemical Kinetics Practice Problems And Solutions
- 8. Staying Engaged with Chemical Kinetics Practice Problems And Solutions
  - Joining Online Reading Communities
  - Participating in Virtual Book Clubs
  - Following Authors and Publishers Chemical Kinetics Practice Problems And Solutions
- 9. Balancing eBooks and Physical Books Chemical Kinetics Practice Problems And Solutions
  - Benefits of a Digital Library
  - Creating a Diverse Reading Collection Chemical Kinetics Practice Problems And Solutions
- 10. Overcoming Reading Challenges
  - Dealing with Digital Eye Strain
  - Minimizing Distractions
  - Managing Screen Time
- 11. Cultivating a Reading Routine Chemical Kinetics Practice Problems And Solutions
  - Setting Reading Goals Chemical Kinetics Practice Problems And Solutions
  - Carving Out Dedicated Reading Time
- 12. Sourcing Reliable Information of Chemical Kinetics Practice Problems And Solutions
  - Fact-Checking eBook Content of Chemical Kinetics Practice Problems And Solutions

- Distinguishing Credible Sources
- 13. Promoting Lifelong Learning
  - Utilizing eBooks for Skill Development
  - Exploring Educational eBooks
- 14. Embracing eBook Trends
  - Integration of Multimedia Elements
  - Interactive and Gamified eBooks

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