

# KINETICS Practice Problems and Solutions

Name: \_\_\_\_\_

AP Chemistry

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

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:  $SO_2 + O_2 \rightarrow SO_3 + O_2$ . 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	$[O_2]$ , 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  
 $O_2$  0
  - Write the rate law for this reaction.  $rate = k[SO_2]^2[O_2]^0$
  - 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  $k = 2.36 mol^{-1}L^2s^{-1}$*
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?  $A_2$   $1^{st}$ ;  $B_2$   $1^{st}$

# Mastering Chemistry Answer Key Kinetics

**Jeffrey Gaffney, Nancy Marley**



## Mastering Chemistry Answer Key Kinetics:

**Chemistry: The Central Science** Theodore L. Brown, H. Eugene LeMay Jr., Bruce E. Bursten, Catherine Murphy, Patrick Woodward, Steven Langford, Darius Sagatys, Adrian George, 2013-10-04 If you think you know the Brown LeMay Bursten Chemistry text think again In response to market request we have created the third Australian edition of the US bestseller Chemistry The Central Science An extensive revision has taken this text to new heights Triple checked for scientific accuracy and consistency this edition is a more seamless and cohesive product yet retains the clarity innovative pedagogy functional problem solving and visuals of the previous version All artwork and images are now consistent in quality across the entire text And with a more traditional and logical organisation of the Organic Chemistry content this comprehensive text is the source of all the information and practice problems students are likely to need for conceptual understanding development of problem solving skills reference and test preparation *Merrill Chemistry* Robert C. Smoot, Smoot, Richard G. Smith, Jack Price, 1998 *General Chemistry for Engineers* Jeffrey Gaffney, Nancy Marley, 2017-11-13 General Chemistry for Engineers explores the key areas of chemistry needed for engineers This book develops material from the basics to more advanced areas in a systematic fashion As the material is presented case studies relevant to engineering are included that demonstrate the strong link between chemistry and the various areas of engineering Serves as a unique chemistry reference source for professional engineers Provides the chemistry principles required by various engineering disciplines Begins with an atoms first approach building from the simple to the more complex chemical concepts Includes engineering case studies connecting chemical principles to solving actual engineering problems Links chemistry to contemporary issues related to the interface between chemistry and engineering practices

**Cracking the SAT II.** Theodore Silver, Princeton Review (Firm), 2001-03-15 The Princeton Review realizes that acing the SAT II Chemistry exam is very different from getting straight As in school They don't try to teach students everything there is to know about chemistry only what they'll need to score higher on the exam There's a big difference In Cracking the SAT II Chemistry The Princeton Review will teach test takers how to think like the test makers and Learn test taking strategies that will help students outsmart the test and improve scores Ace the exam by becoming familiar with the format Use the Process of Elimination and the divide and conquer method to solve complicated problems Perfect test taking skills with practice questions and detailed answer explanations This book includes 2 full length simulated SAT II Chemistry exams All of the sample test questions are just like the ones test takers will see on the actual exam and every solution is fully explained Contents Include I Introduction II Test Strategies III Some Basic Stuff Mass Volume Density Pressure Energy Temperature and Specific Heat IV Elements Atoms and Ions Atoms and Elements V Chemical Reaction and Stoichiometry Molecules The Mole Chemical Reactions Reaction Stoichiometry Entropy Enthalpy Spontaneity and Gibbs Free Energy VI Electron configurations and Radioactivity Electrons and Orbitals Radioactivity VII The Periodic Table and Bonding The Periodic Table More About the Periodic Table Some Important Trends VIII Solids Liquids and

Gases Gases Intermolecular Forces Phase Changes Energy and Phase Changes IX Solutions Solutions Concentrations Solubility and Saturation X Kinetics and Equilibrium Kinetics Factors that Affect Reaction Rate Reversible Reactions and Chemical Equilibrium Le Chatelier's Principle XI Acids and Bases Acids and Bases Titration XII Redox and Electrochemistry Oxidation and Reduction Electrochemistry XIII Organic Chemistry Hydrocarbons Functional Groups XIV Laboratory Safety Rules Accuracy Significant Figures Lab Procedures Laboratory Equipment XV Practice Tests **30 Days to Success: The Ultimate Revision Blueprint For NEET-UG IIT-JEE & Other Competitive Exams** Dr Giriraj Vishwakarma, 2025-01-21 Ace Your Competitive Exams in Just 30 Days 30 Days to Success The Ultimate Revision Blueprint for NEET UG IIT JEE Other Competitive Exams by Dr Giriraj Vishwakarma This comprehensive guide is your key to mastering the final stretch with Proven 30 day revision plans for NEET JEE Chapter wise weightage and syllabus breakdowns Expert strategies for time management and stress reduction Mock tests and practical tips for exam success Whether you're aiming for medical or engineering excellence this book is your trusted companion to stay focused motivated and prepared Transform your study strategy boost your confidence and get closer to achieving your dream rank Your success is just 30 days away

Organometallic Modeling of the Hydrodesulfurization and Hydrodenitrogenation Reactions Robert A.

Sánchez-Delgado, 2006-04-11 The fields of hydrodesulfurization HDS and hydrodenitrogenation HDN continue to attract the attention of researchers in the various disciplines connected to these fascinating problems that represent two of the key outstanding chemical challenges for the petroleum refining industry in view of their very strong environmental and commercial implications One area that has flourished impressively over the last 15 years is the organometallic chemistry of thiophenes and other related sulfur containing molecules This has become a powerful method for modeling numerous surface species and reactions implicated in HDS schemes and nowadays it represents an attractive complement to the standard procedures of surface chemistry and heterogeneous catalysis for understanding the complex reaction mechanisms involved in this process Similar developments have begun to appear in connection with HDN mechanisms although in a much more modest scale and depth Some years ago when encouraged by Prof B R James this book was planned several excellent reviews and monographs treating different aspects of HDS were already available including some on the subject of organometallic models However it seemed appropriate to try to summarize the most striking features of this chemistry in an updated and systematic way and inasmuch as possible in connection with the common knowledge and beliefs of the mechanisms of heterogeneous HDS catalysis Hopefully this attempt to build some conceptual bridges between these two traditionally separated areas of chemistry has met with some success *Physical Chemistry* John S. Winn, 1995 This text presents physical chemistry as a coherent whole rather than a set of disjointed topics and shows how the subject relates to the rest of chemistry and physics It emphasizes physical models as well as mathematical techniques along with both rigorous and approximate order of magnitude problem solving Designed to progress beyond a numerical answer problems expose the

physical significance of the situation and teach students how to pose a problem in the first place In addition modern molecular concepts currently unanswered problems in research experimental techniques and new directions in the field are introduced wherever appropriate An orderly progression of thermodynamics carefully builds students knowledge without covering too much too early on Chemical reaction thermodynamics is covered in Chapter 7 after the culmination of thermodynamics with advanced material in Chapter 10

### **Programmed Learning and Individually Paced Instruction**

Carl H. Hendershot,1973 **PDE Toolbox Primer for Engineering Applications with MATLAB® Basics** Leonid Burstein,2022-06-07 Partial differential equations PDEs describe technological phenomena and processes used for the analysis design and modeling of technical products Solutions of spatial and transient PDEs are realized by using the PDE Toolbox included in the MATLAB software MATLAB is introduced here as an essential foundation for PDE and the Modeler of the PDE Toolbox with appropriate explanatory solutions is applied to engineering problems in mechanics heat mass transfer tribology materials science physics and biotechnology The appendixes contain collections of commands and functions used to solve actual engineering problems FEATURES Includes the PDE Modeler interface with example solutions of two and three dimensional PDEs Presents methodologies for all types of PDEs as representative of any engineering problem Describes the ordinate differential equation ODE solver for initial value and boundary value problems IVP and BVP through practical examples from mechanics and the thermodynamic properties of materials Covers the basics of MATLAB to solve both ODEs and PDEs Reviews spatially the one dimensional PDE solver with actual engineering examples PDE Toolbox Primer for Engineering Applications with MATLAB Basics is aimed at scientists students professionals practitioners self taught readers and researchers who need concise and clear information to study and apply MATLAB software and the PDE Toolbox in engineering General College Chemistry Charles William Keenan,Donald C. Kleinfelter,Jesse Hermon Wood,1980

**Bionanocomposites** Carole Aimé,Thibaud Coradin,2017-07-24 Beginning with a general overview of nanocomposites Bionanocomposites Integrating Biological Processes for Bio inspired Nanotechnologies details the systems available in nature nucleic acids proteins carbohydrates lipids that can be integrated within suitable inorganic matrices for specific applications Describing the relationship between architecture hierarchy and function this book aims at pointing out how bio systems can be key components of nanocomposites The text then reviews the design principles structures functions and applications of bionanocomposites It also includes a section presenting related technical methods to help readers identify and understand the most widely used analytical tools such as mass spectrometry calorimetry and impedance spectroscopy among others

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