

Physical Chemistry Formula Revision

Basic Concepts

$$\text{Average atomic mass} = \frac{a_1x_1 + a_2x_2 + a_3x_3 + \dots}{100}$$

$a_1, a_2, a_3, \dots$ - atomic mass of isotopes

$x_1, x_2, x_3, \dots$ - percentage abundance

Mole concept

$$\text{no. of moles, } n = \frac{\text{given mass}}{\text{molar mass}} = \frac{W}{M}$$

$$n = \frac{\text{no. of particles}}{\text{Avogadro's No.}} = \frac{N}{6.022 \times 10^{23}}$$

$$n = \frac{\text{vol. of gas}}{\text{vol. of gas at STP}} = \frac{V}{22.4 \text{ L}}$$

Concentration Terms

$$\text{Percentage, \%} = \frac{W_2 \text{ or } V_2}{W_1 \text{ or } V_1} \times 100$$

$$\text{Molarity, } M = \frac{n_2}{V(l)} = \frac{W_2 \times 1000}{M_2 \times V(\text{ml})}$$

$$\text{Normality, } N = \frac{n_2 \times 1000}{V(l)} = \frac{W_2 \times 1000}{E_2 \times V(\text{ml})}$$

$\hookrightarrow \frac{W_2}{n_2}$

$$\text{parts per million, ppm} = \frac{W_2}{W_1} \times 10^6$$

$$\text{Molality, } m = \frac{n_2}{W_1 (g)} = \frac{W_2 \times 1000}{M_2 \times W_1 (g)}$$

$$\text{Mole fraction, } x_2 = \frac{n_2}{n_1 + n_2 + n_3 + \dots}$$

Stoichiometry



$$\frac{\text{moles of A}}{a} = \frac{\text{moles of B}}{b} = \frac{\text{moles of C}}{c}$$

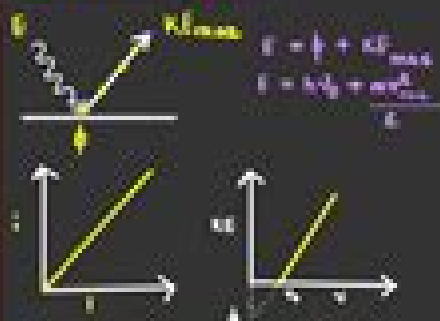
Limiting R_2 : $\frac{\text{given amt.}}{\text{stoichiometric coeff.}} \rightarrow \text{lowest}$

Atomic Structure

Planck's Quantum Theory

$$E = \frac{hc}{\lambda} \quad E (\text{eV}) = \frac{12400}{\lambda (\text{\AA})}$$

Photo Electric Effect



De Broglie's Hypothesis

$$m\lambda = \frac{h\nu}{\lambda} \rightarrow \lambda = \frac{h}{mv} \quad \lambda = \frac{h}{\sqrt{2meV}}$$

Schrodinger's Atomic model

$$mvr = \frac{nh}{2\pi} \quad r = 0.53 \times \frac{n^2}{Z} \text{ \AA}$$

$$r = 2.18 \times 10^{-8} \frac{n^2}{Z} \text{ m}$$

$$E_n = -13.6 \times \frac{Z^2}{n^2} \text{ eV} \quad TE = \frac{E_f}{2} = -13.6$$

$$\frac{1}{\lambda} = R_H Z^2 \left[\frac{1}{n_1^2} - \frac{1}{n_2^2} \right] \quad R_H = 1.1 \times 10^7 \text{ m}^{-1}$$

max no. of spectral lines when e^- returns from $n_2 = n_1 + 1$ to $n_1 = 1$: $\frac{n_2(n_2-1)}{2}$

Heisenberg's Uncertainty Principle: $\Delta x \Delta p \geq \frac{h}{4\pi}$

Quantum Model

$$\text{total nodes} = n - 1$$

$$\text{angular nodes} = l$$

$$\text{radial nodes} = n - l - 1$$

Angular momentum

$$\text{orbital} = \sqrt{l(l+1)} \frac{h}{2\pi}$$

$$\text{spin} = \sqrt{s(s+1)} \frac{h}{2\pi}$$

Physical Chemistry

Kenneth S Schmitz



Physical Chemistry:

Physical Chemistry Robert G. Mortimer, 2000 Includes developments in the theories of chemical reaction kinetics and molecular quantum mechanics as well as in the experimental study of extremely rapid chemical reactions It proceeds from fundamental principles and shows how the consequences of these principles and postulates apply to the chemical and physical phenomena being studied

Physical Chemistry Kurt W. Kolasinski, 2016-11-14 Much of chemistry is motivated by asking How How do I make a primary alcohol React a Grignard reagent with formaldehyde Physical chemistry is motivated by asking Why The Grignard reagent and formaldehyde follow a molecular dance known as a reaction mechanism in which stronger bonds are made at the expense of weaker bonds If you are interested in asking why and not just how then you need to understand physical chemistry Physical Chemistry How Chemistry Works takes a fresh approach to teaching in physical chemistry This modern textbook is designed to excite and engage undergraduate chemistry students and prepare them for how they will employ physical chemistry in real life The student friendly approach and practical contemporary examples facilitate an understanding of the physical chemical aspects of any system allowing students of inorganic chemistry organic chemistry analytical chemistry and biochemistry to be fluent in the essentials of physical chemistry in order to understand synthesis intermolecular interactions and materials properties For students who are deeply interested in the subject of physical chemistry the textbook facilitates further study by connecting them to the frontiers of research Provides students with the physical and mathematical machinery to understand the physical chemical aspects of any system Integrates regular examples drawn from the literature from contemporary issues and research to engage students with relevant and illustrative details Important topics are introduced and returned to in later chapters key concepts are reinforced and discussed in more depth as students acquire more tools Chapters begin with a preview of important concepts and conclude with a summary of important equations Each chapter includes worked examples and exercises discussion questions simple equation manipulation questions and problem solving exercises Accompanied by supplementary online material worked examples for students and a solutions manual for instructors Fifteen supporting videos from the author presenting such topics as Entropy Rate Laws Sequestration Electrochemistry etc Written by an experienced instructor researcher and author in physical chemistry with a voice and perspective that is pedagogical and engaging

Atkins' Physical Chemistry Peter Atkins, Julio de Paula, 2010 This volume features a greater emphasis on the molecular view of physical chemistry and a move away from classical thermodynamics It offers greater explanation and support in mathematics which remains an intrinsic part of physical chemistry

Physical Chemistry Ira N. Levine, 2002 The fifth edition of this book provides students with an in depth fundamental treatment of physical chemistry The treatment is made easy to follow by giving full step by step derivations with clear explanations and by avoiding advanced mathematics unfamiliar to students Necessary maths and physics have thorough review sections Worked examples are followed by a practice exercise

Mathematics for Physical Chemistry

Robert G. Mortimer, 2005 Offering comprehensive coverage of the mathematics needed for undergraduate level physical chemistry this book also serves as a reference for graduate students and practising chemists **Mathematics for Physical Chemistry** Robert G. Mortimer, 2013-06-07 Mathematics for Physical Chemistry is the ideal supplementary text for practicing chemists and students who want to sharpen their mathematics skills while enrolled in general through physical chemistry courses This book specifically emphasizes the use of mathematics in the context of physical chemistry as opposed to being simply a mathematics text This 4e includes new exercises in each chapter that provide practice in a technique immediately after discussion or example and encourage self study The early chapters are constructed around a sequence of mathematical topics with a gradual progression into more advanced material A final chapter discusses mathematical topics needed in the analysis of experimental data Numerous examples and problems interspersed throughout the presentations Each extensive chapter contains a preview and objectives Includes topics not found in similar books such as a review of general algebra and an introduction to group theory Provides chemistry specific instruction without the distraction of abstract concepts or theoretical issues in pure mathematics **Physical Chemistry** Kurt W. Kolasinski, 2016-10-10 Much of chemistry is motivated by asking How How do I make a primary alcohol React a Grignard reagent with formaldehyde Physical chemistry is motivated by asking Why The Grignard reagent and formaldehyde follow a molecular dance known as a reaction mechanism in which stronger bonds are made at the expense of weaker bonds If you are interested in asking why and not just how then you need to understand physical chemistry Physical Chemistry How Chemistry Works takes a fresh approach to teaching in physical chemistry This modern textbook is designed to excite and engage undergraduate chemistry students and prepare them for how they will employ physical chemistry in real life The student friendly approach and practical contemporary examples facilitate an understanding of the physical chemical aspects of any system allowing students of inorganic chemistry organic chemistry analytical chemistry and biochemistry to be fluent in the essentials of physical chemistry in order to understand synthesis intermolecular interactions and materials properties For students who are deeply interested in the subject of physical chemistry the textbook facilitates further study by connecting them to the frontiers of research Provides students with the physical and mathematical machinery to understand the physical chemical aspects of any system Integrates regular examples drawn from the literature from contemporary issues and research to engage students with relevant and illustrative details Important topics are introduced and returned to in later chapters key concepts are reinforced and discussed in more depth as students acquire more tools Chapters begin with a preview of important concepts and conclude with a summary of important equations Each chapter includes worked examples and exercises discussion questions simple equation manipulation questions and problem solving exercises Accompanied by supplementary online material worked examples for students and a solutions manual for instructors Fifteen supporting videos from the author presenting such topics as Entropy Rate Laws Sequestration Electrochemistry etc Written by an

experienced instructor researcher and author in physical chemistry with a voice and perspective that is pedagogical and engaging

Physical Chemistry Ignacio Tinoco (Jr.), Kenneth Sauer, James C. Wang, 1985

Physical Chemistry for the Chemical and Biological Sciences Raymond Chang, 2000-05-12 Hailed by advance reviewers as a kinder gentler P Chem text this book meets the needs of an introductory course on physical chemistry and is an ideal choice for courses geared toward pre medical and life sciences students Physical Chemistry for the Chemical and Biological Sciences offers a wealth of applications to biological problems numerous worked examples and around 1000 chapter end problems

Understanding Physical Chemistry Dor Ben-Amotz, 2013-05-06 Understanding Physical Chemistry takes an innovative approach to teaching this fundamentally important subject by stressing core ideas such as the entropic forces that drive all chemical processes and the quantum states that dictate the structures and colors of atoms and molecules This elegant and streamlined textbook of under 400 pages aims to instill a deep understanding of physical chemistry by focusing exclusively on those ideas that are deemed to be either too important or too interesting to exclude These core ideas are demystified by explaining where they come from why they make sense and how they may be applied to understanding topics ranging from molecular spectroscopy and chemical reactivity to biological self assembly and liquid computer simulation strategies Another unique feature of this groundbreaking textbook is the insight it provides into the scientific discovery process by highlighting the personal perspectives and conceptual struggles of people such as Gibbs Einstein and Schrödinger who pioneered this interesting and practically important field

Applied Physical Chemistry with Multidisciplinary Approaches A. K. Haghi, Devrim Balköse, Sabu Thomas, 2018-05-03 Presenting illustrative case studies highlighting technological applications and explaining theoretical and foundational concepts this book is an important reference source on the key concepts for modern technologies and optimization of new processes in physical chemistry This volume combines up to date research findings and relevant theoretical frameworks on applied chemistry materials and chemical engineering This new volume presents an up to date review of modern materials and chemistry concepts issues and recent advances in the field Distinguished scientists and engineers from key institutions worldwide have contributed chapters that provide a deep analysis of their particular subjects At the same time each topic is framed within the context of a broader more multidisciplinary approach demonstrating its relationship and interconnectedness to other areas The premise of this book therefore is to offer both a comprehensive understanding of applied science and engineering as a whole and a thorough knowledge of individual subjects This approach appropriately conveys the basic fundamentals state of the art technology and applications of the involved disciplines and further encourages scientific collaboration among researchers This volume emphasizes the intersection of chemistry math physics and the resulting applications across many disciplines of science and explores applied physical chemistry principles in specific areas including the life chemistry environmental sciences geosciences and materials sciences The applications from these multidisciplinary fields illustrate methods that can be used to model physical processes design new products and

find solutions to challenging problems *Chemistry, Vol. I: Lessons 1 - 45* Quantum Scientific Publishing, 2023-06-12
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Physical Chemistry and Its Biological Applications

Wallace Brey, 2012-12-02 Physical Chemistry and Its Biological Applications presents the basic principles of physical chemistry and shows how the methods of physical chemistry are being applied to increase understanding of living systems Chapters 1 and 2 of the book discuss states of matter and solutions of nonelectrolytes Chapters 3 to 5 examine laws in thermodynamics and solutions of electrolytes Chapters 6 to 8 look at acid base equilibria and the link between electromagnetic radiation and the structure of atoms Chapters 9 to 11 cover different types of bonding the rates of chemical reactions and the process of adsorption Chapters 12 to 14 present molecular aggregates magnetic resonance spectroscopy and photochemistry and radiation This book is useful to biological scientists for self study and reference With modest additions of mathematical material by the teacher the book should also be suitable for a full year major's course in physical chemistry

Physical Chemistry Andrew Cooksy, 2013-01-03 Fostering an intuitive understanding of chemistry Physical Chemistry Quantum Chemistry and Molecular Interactions presents the structure and unity of the theoretical framework of modern chemistry in a progression from the single atom to the bulk limit Employing an engaging and somewhat informal tone this new text delivers a superior presentation of rigorous mathematical derivations thermodynamics and quantum theory and mechanics in a manner that is accessible and applicable to diverse readers

Principles of Soil Chemistry

Kim H. Tan, 2010-10-18 Learn the secrets of soil chemistry and its role in agriculture and the environment Examine the fundamental laws of soil chemistry how they affect dissolution cation and anion exchange and other reactions Explore how water can form water bridges and hydrogen bonding the most common forces in adsorption chelation and more Discover how elect

Catalogue for the Academic Year Naval Postgraduate School (U.S.), 1958 *Physical Chemistry* Kenneth S Schmitz, 2016-06-01 Physical Chemistry Concepts and Theory provides a comprehensive overview of physical and theoretical chemistry while focusing on the basic principles that unite the sub disciplines of the field With an emphasis on multidisciplinary as well as interdisciplinary applications the book extensively reviews fundamental principles and presents recent research to help the reader make logical connections between the theory and application of physical chemistry concepts Also available from the author Physical Chemistry Multidisciplinary Applications ISBN 9780128005132 Describes how materials behave and chemical reactions occur at the molecular and atomic levels Uses theoretical constructs and mathematical computations to explain chemical properties and describe behavior of molecular and condensed matter Demonstrates the connection between math and chemistry and how to use math as a powerful tool to predict the properties

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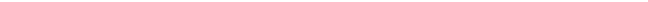
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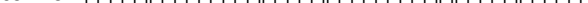
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