

SOLUTIONS
THERMODYNAMICS PRACTICE PROBLEMS FOR NON-TECHNICAL MAJORS

Thermodynamic Properties

1. If an object has a weight of 10 lbf on the moon, what would the same object weigh on Jupiter?

$$g_{\text{Jupiter}} = 75 \frac{\text{ft}}{\text{sec}^2} \quad g_{\text{Moon}} = 5.4 \frac{\text{ft}}{\text{sec}^2} \quad g_c = 32 \frac{\text{lbm-ft}}{\text{lbf-sec}^2}$$

$$|W| = \frac{mg}{g_c} \Rightarrow m = \frac{|W|_{\text{Moon}} g_c}{g_{\text{Moon}}} = \frac{10 \times 32}{5.4} = 59.26 \text{ lbm}$$

$$|W|_{\text{Jupiter}} = \frac{mg_{\text{Jupiter}}}{g_c} = \frac{59.26 \times 75}{32} = \boxed{139 \text{ lbf}}$$

2. An object that weighs 50 lbf on earth is moved to Saturn where its new weight is 105 lbf. What is the acceleration due to gravity on Saturn?

$$g_{\text{Earth}} = 32 \frac{\text{ft}}{\text{sec}^2} \quad g_c = 32 \frac{\text{lbm-ft}}{\text{lbf-sec}^2}$$

$$50 \text{ lbf on earth} \Rightarrow 50 \text{ lbm}$$

$$|W| = \frac{mg}{g_c} \Rightarrow g = \frac{|W| g_c}{m} = \frac{105 \times 32}{50} = \boxed{67.2 \frac{\text{ft}}{\text{sec}^2}}$$

3. Define, using equations, specific volume (v) and density (ρ). What is the mathematical relationship between these two terms?

$$v = \frac{V}{m}, \quad \rho = \frac{m}{V}, \quad v = \frac{1}{\rho} \text{ or } \rho = \frac{1}{v}$$

Temperature and Pressure Measurements

4. (a) Define temperature.
(b) What is the absolute temperature scale corresponding to Fahrenheit?
(c) Convert 100° F to that absolute scale.

(a) Temperature: a measure of molecular activity of a substance.

(b) Rankine

(c) °R = °F + 460 $\Rightarrow$ 100° F converts to 560° R

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Maka Aleksishvili, Shota Sidamonidze



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Thermodynamics Problem Solver The Editors of REA, Ralph Pike, 2013-01-01 REA's Thermodynamics Problem Solver Each Problem Solver is an insightful and essential study and solution guide chock full of clear concise problem solving gems Answers to all of your questions can be found in one convenient source from one of the most trusted names in reference solution guides More useful more practical and more informative these study aids are the best review books and textbook companions available They re perfect for undergraduate and graduate studies This highly useful reference provides thorough coverage of pressure work and heat energy entropy first and second laws ideal gas processes vapor refrigeration cycles mixtures and solutions For students in engineering physics and chemistry **Problems in Chemical Thermodynamics with Solutions** Maka Aleksishvili, Shota Sidamonidze, 2002 The methods of chemical thermodynamics are effectively used in many fields of science and technology Mastering these methods and their use in practice requires profound comprehension of the theoretical questions and acquisition of certain calculating skills This book is useful to undergraduate and graduate students in chemistry as well as chemical thermal and refrigerating technology it will also benefit specialists in all other fields who are interested in using these powerful methods in their practical activities *Problems and Solutions in Engineering Thermodynamics* S C. Singhal, 2009-02-01 **Thermodynamics Problem Solving in Physical Chemistry** Kathleen E. Murphy, 2020-03-23 Thermodynamics Problem Solving in Physical Chemistry Study Guide and Map is an innovative and unique workbook that guides physical chemistry students through the decision making process to assess a problem situation create appropriate solutions and gain confidence through practice solving physical chemistry problems The workbook includes six major sections with 20 30 solved problems in each section that span from easy single objective questions to difficult multistep analysis problems Each section of the workbook contains key points that highlight major features of the topic to remind students of what they need to apply to solve problems in the topic area Key Features Provides instructor access to a visual map depicting how all equations used in thermodynamics are connected and how they are derived from the three major energy laws Acts as a guide in deriving the correct solution to a problem Illustrates the questions students should ask themselves about the critical features of the concepts to solve problems in physical chemistry Can be used as a stand alone product for review of Thermodynamics questions for major tests **Thermodynamics** Ryogo Kubo, 1976 **Thermodynamics** Ryōgo Kubo, 1968 **Problems and Solutions on Thermodynamics and Statistical Mechanics** Yung-kuo Lim, 1990 Volume 5 **Solutions to Selected Problems in A Course in Statistical Thermodynamics** Joseph Kestin, 2012-12-02 Solutions to Selected Problems In a Course in Statistical Thermodynamics is the companion book to A Course in Statistical Thermodynamics This title provides the solutions to a select number of problems contained in the main title The problem sets explores the physical aspects of the methodology of statistical thermodynamics without the use of advanced mathematical methods This book is divided into 14 chapters that focus on such items as the statistical method to

various specialized applications of statistical thermodynamics

Problems and Solutions to Accompany Molecular

Thermodynamics Heather Cox, Carole H. McQuarrie, 1999

Problems And Solutions On Thermodynamics And Statistical

Mechanics (Second Edition) Swee Cheng Lim, Choy Heng Lai, Leong-chuan Kwek, 2021-11-18 This volume is a compilation of carefully selected questions at the PhD qualifying exam level including many actual questions from Columbia University University of Chicago MIT State University of New York at Buffalo Princeton University University of Wisconsin and the University of California at Berkeley over a twenty year period Topics covered in this book include the laws of thermodynamics phase changes Maxwell Boltzmann statistics and kinetic theory of gases This latest edition has been updated with more problems and solutions and the original problems have also been modernized excluding outdated questions and emphasizing those that rely on calculations The problems range from fundamental to advanced in a wide range of topics on thermodynamics and statistical physics easily enhancing the student's knowledge through workable exercises Simple to solve problems play a useful role as a first check of the student's level of knowledge whereas difficult problems will challenge the student's capacity on finding the solutions

Solutions Manual for an Introduction to Thermodynamics Y.V.C.

Rao, 2005-02 This manual contains the complete solution for all the 505 chapter end problems in the textbook An Introduction to Thermodynamics and will serve as a handy reference to teachers as well as students The data presented in the form of tables and charts in the main textbook are made use of in this manual for solving the problems

Solutions to Selected

Problems in a Course in Statistical Thermodynamics Joseph Kestin, 1971

Commonly Asked Questions in

Thermodynamics Marc J. Assael, William A. Wakeham, Anthony R. H. Goodwin, Stefan Will, Michael Stamatoudis, 2011-03-14

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Thermodynamics and Statistical Physics Peter T. Landsberg, 2014-07-16 Well respected and widely used this volume presents problems and full solutions related to a wide range of topics in thermodynamics statistical physics and statistical mechanics The text is intended for instructors undergraduates and graduate students of mathematics physics chemistry and engineering Twenty eight chapters each prepared by an expert proceed from simpler to more difficult subjects Similarly the early chapters are easier than the later ones making the book ideal for independent study Subjects begin with the laws of thermodynamics and statistical theory of information and of ensembles advancing to the ideal classical gases of polyatomic molecules non electrolyte liquids and solutions and surfaces Subsequent chapters explore imperfect classical and quantum gas phase transitions cooperative phenomena Green function methods the plasma transport in gases and metals Nyquist's theorem and its generalizations stochastic methods and many other topics

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Fogiel, Ralph W. Pike, Research and Education Association, 1993 REA's Thermodynamics Problem Solver Each Problem Solver

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Fundamentals and Practice in Statistical Thermodynamics, Solutions Manual Jianzhong Wu, John M. Prausnitz, 2024-07-12 This is a solutions manual to accompany Fundamentals and Practice in Statistical Thermodynamics This textbook supplements modernizes and updates thermodynamics courses for both advanced undergraduates and graduate students by introducing the contemporary topics of statistical mechanics such as molecular simulation and liquid state methods with a variety of realistic examples from the emerging areas of chemical and materials engineering Current curriculum does not provide the necessary preparations required for a comprehensive understanding of these powerful tools for engineering applications This text presents not only the fundamental ideas but also theoretical developments in molecular simulation and analytical methods to engineering students by illustrating why these topics are of pressing interest in modern high tech applications

Solutions Manual for The Dynamics of Heat Hans U. Fuchs, 2012-12-06 This manual contains detailed solutions of slightly more than half of the end of chapter problems in The Dynamics of Heat The numbers of the problems included here are listed on the following page A friend who knows me well noticed that I have included only those problems which I could actually solve myself Also to make things more interesting I have built random errors into the solutions If you find any of them please let me know Also if you have different ways of solving a problem I would be happy to hear from you Any feedback also on the book in general would be greatly appreciated There is an Errata sheet for the first printing of The Dynamics of Heat By the time you read this it should be available on the Internet for you to download A reference to the URL of the sheet can be found in the announcement of my book on Springer's WWW pages www.springer-ny.com Winterthur 1996 Hans Fuchs vi Numbers of Problems Solved Prologue 1 2 4 5 6 8 12 13 17 19 23 25 27 30 32 33 34 38 39 40 42 44 47 49 50 53 55 60 61 62 Chapter 1 2 4 5 8 9 11 13 15 16 17 18 20 21 24 26 27 29 31 33 34 37 39 41 42 44 45 47 49 51 53 55 57 58 60 62 Chapter 2 1 3 5 6 7 9 10 12 14 15 16 17 19 20 22 23 24 26 27 29 30 32 33 36 37 38 41 42 46 47 49 Interlude 2 3 4 5 6 8 10 11 12 13 18 19 20 21 23 24 28 Chapter 3 2 4 6 8 10 12 15 16 17 18 22 24 25 28 30 31 35 36 Chapter 4 1 2 4 6 8 9 11 12 13 15 18 20 21 22 25 27 28 29 30 31 33 34 35 39 40 43 44 46 Epilogue 1 2 11 PROLOGUE Solutions of Selected Problems 2 PROLOGUE Problem 1 Calculate the hydraulic capacitance of a glass tube used in a mercury pressure gauge The inner diameter of the tube is 8.0 mm

Thermodynamics: an Advanced Course with Problems and Solutions r. Kubo (+and others), 1968

Thermodynamics Rumi Michael Leigh, 2023-05-24

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