

Thermodynamics Study Guide

Equations that you need to know:

$$PV = nRT = Nk_B T \quad (\text{ideal gas law})$$

$$\text{KE} = \frac{3}{2} k_B T \quad (\text{translational energy of gas molecules})$$

$$Q = mc \Delta T \quad (\text{def. of specific heat capacity})$$

$$Q = mL \quad (\text{def. of latent heat})$$

$$\Delta U = Q - W \quad (\text{first law / energy conservation})$$

$$W = P \Delta V = \text{area under } P\text{-}V \text{ graph} \quad (\text{work done during expansion})$$

$$\Delta S = \frac{Q}{T} \quad (\text{increase in entropy due to heat input})$$

$$\text{engine efficiency} = \frac{\text{benefit}}{\text{cost}} = \frac{W_{\text{net}}}{Q_h}$$

$$\text{refrigerator coef. of performance} = \frac{\text{benefit}}{\text{cost}} = \frac{Q_c}{W_{\text{net}}}$$

I'll give you the formulas for thermal expansion, heat conduction, and radiation:

$$\frac{\Delta L}{L_0} = \alpha \Delta T \quad \frac{\Delta V}{V_0} = \beta \Delta T \quad \frac{Q}{\Delta t} = \frac{k_t A (T_h - T_c)}{\Delta x} \quad \frac{Q}{\Delta t} = \epsilon \sigma A T^4$$

You should understand the following terms/concepts:

- temperature
- thermal equilibrium
- ideal gas
- mole
- rms speed
- phase transformation
- heat
- work
- conduction
- convection
- radiation
- isothermal
- adiabatic
- entropy
- second law of thermodynamics

Finally, you should know the approximate numerical values of the following: room temperature in kelvin; atmospheric pressure in N/m^2 ; the number of liters in a m^3 ; the gas constant; Avogadro's number; Boltzmann's constant; and the number of joules in a calorie (i.e., the specific heat capacity of water).

Thermodynamics Study Guide

Elias I. Franses



Thermodynamics Study Guide:

Fundamentals of Thermodynamics Mr. Rohit Manglik, 2023-07-23 Explains thermodynamic principles laws and their applications in engineering systems

Fundamentals of Engineering Thermodynamics Michael J. Moran, Howard N. Shapiro, Daisy D. Boettner, Margaret B. Bailey, 2010-12-07 This leading text in the field maintains its engaging readable style while presenting a broader range of applications that motivate engineers to learn the core thermodynamics concepts Two new coauthors help update the material and integrate engaging new problems Throughout the chapters they focus on the relevance of thermodynamics to modern engineering problems Many relevant engineering based situations are also presented to help engineers model and solve these problems

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Fundamentals of Thermodynamics Claus Borgnakke,Richard E. Sonntag,2020-07-08 The field s leading textbook for more than three decades Fundamentals of Engineering Thermodynamics offers a comprehensive introduction to essential principles and applications in the context of engineering Now in its Tenth Edition this book retains its characteristic rigor and systematic approach to thermodynamics with enhanced pedagogical features that aid in student comprehension Detailed appendices provide instant reference chapter summaries review terminology equations and key concepts and updated data and graphics increase student engagement while enhancing understanding Covering classical thermodynamics with a focus on practical applications this book provides a basic foundational skillset applicable across a variety of engineering fields Worked examples demonstrate the appropriate use of new formulas while clarifying the proper approach to generalized problems of a

relevant nature Going beyond the usual guidance in the basics of the field this book is designed as comprehensive preparation for more advanced study in students engineering field of choice Thermodynamics with Chemical Engineering Applications Elias I. Franses, 2014-08-25 Master the principles of thermodynamics with this comprehensive undergraduate textbook carefully developed to provide students of chemical engineering and chemistry with a deep and intuitive understanding of the practical applications of these fundamental ideas and principles Logical and lucid explanations introduce core thermodynamic concepts in the context of their measurement and experimental origin giving students a thorough understanding of how theoretical concepts apply to practical situations A broad range of real world applications relate key topics to contemporary issues such as energy efficiency environmental engineering and climate change and further reinforce students understanding of the core material This is a carefully organized highly pedagogical treatment including over 500 open ended study questions for discussion over 150 varied homework problems clear and objective standards for measuring student progress and a password protected solution manual for instructors **Fundamentals of Chemistry, Study Guide** James E. Brady, John R. Holum, 1988-04-20 This Third Edition of the widely used fundamentals textbook for science majors maintains the conversational writing style that made the previous editions so popular while including up to date treatments of important and current topics Emphasizes descriptive chemistry chemical reactions and properties while maintaining a solid treatment of chemical principles Common chemicals are used whenever possible as examples in both theoretical discussions and in problems and exercises Incorporates many pedagogical aids each chapter begins with a brief table of contents and each section begins with a preview of topics covered Chapters include frequent margin comments figures and photographs Thermodynamics Jr. Logan, 1999-06-18 Provides a solid grounding in the basic principles of the science of thermodynamics proceeding to practical hands on applications in large scale industrial settings Presents myriad applications for power plants refrigeration and air conditioning systems and turbomachinery Features hundreds of helpful example problems and analytical exercises **Enzymes** Thomas W. Traut, 2025-07-30 This book summarizes mountains of research by various scientists in the field of general biochemistry with an emphasis on enzymes which make all the important molecules in our body such as DNA proteins etc Enzymes are also essential for removing all toxic chemicals that inadvertently enter our body All metabolic reactions in our body are performed by enzymes But perhaps most importantly it should give the reader a satisfying feeling of knowing Aha That is how my cells work **Munson, Young and Okiishi's Fundamentals of Fluid Mechanics** Philip M. Gerhart, Andrew L. Gerhart, John I. Hochstein, 2016-09-13 NOTE The Binder ready Loose leaf version of this text contains the same content as the Bound Paperback version Fundamentals of Fluid Mechanics 8th Edition offers comprehensive topical coverage with varied examples and problems application of visual component of fluid mechanics and strong focus on effective learning The text enables the gradual development of confidence in problem solving The authors have designed their presentation to enable the gradual

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Thermal Physics and Statistical Mechanics Mr. Rohit Manglik,2024-03-02
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Chemistry, Study Guide James E. Brady,John R. Holum,1993-02-11 Offers accurate lucid and interesting explanations of basic concepts and facts of chemistry

while helping students develop skills in analytical thinking and problem solving Students are taught in a variety of ways to think of skills as tools that can be used to solve complex problems Several aids are included to help focus and inspire student interest frequent reference to common chemicals in commercial products numerous photographs of reactions in chapter practice exercises following worked examples **Environmental Science** Michael L. McKinney, Robert M. Schoch, 2003
This edition provides a comprehensive overview and synthesis of current environmental issues and problems

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