

Date Performed _____

SCORE _____

/20

Activity No.2 SPECIFIC HEAT OF SOLIDS

INTRODUCTION

Calorimetry means “measuring heat.” When heat flow occurs between two bodies that are isolated from their surroundings, the amount of heat lost by one body must be equal to the amount of heat gained by the other. Heat is a form of energy in transit, so this principle is just a conservation of energy. We take each quantity added to a body as positive and each quantity leaving a body as negative. When several bodies interact, the algebraic sum of the quantities of heat transferred to all the bodies must be zero.

The mathematical representation of the amount of heat Q needed to achieve a temperature change by a material with mass m and specific heat capacity c is

where T = final temperature, and initial temperature.

In an isolated system, there is no transfer of either mass or energy to its environment. For such case the total heat in the system is conserved, that is,

Specific Heat Capacity for Some Materials/Substance

Material/Substance	Specific Heat c	
	(cal/g $^{\circ}$ C)	(J/Kg $^{\circ}$ C)
Water	1.000	4190
Copper	0.093	390
Lead	0.031	130
Steel	0.118	470
Aluminum	0.217	910

OBJECTIVE

To measure the specific heat capacity of two kinds of solid specimens by calorimetry.

APPARATUS

Steam generator with cup, calorimeter, 2 thermometers, 2 kinds of metal shots, platform balance, slotted masses, 600 ml. beaker, electric stove, extension cord, rug

PROCEDURE

<https://www.youtube.com/watch?v=d4iCJakz2i8>

1. Fill the steam generator 1/2 full of water and start heating it over the stove. Set the stove range dial to **medium**.
2. Record the two kinds of metal shots in Table 2.1.
3. Weigh about 100 grams of the first metal shots. Pour these in the steam can (inner cup of the steam generator) and place the can in the steam generator. Cover the steam can with a cork with two holes, one for the thermometer and the other for the stirrer. Heat the shots over the steam generator and stir occasionally. **Do not use the thermometer to stir the shots** but keep the thermometer embedded in the shots. Continue heating and observe the thermometer until all the

Specific Heat Of Solids

Ensheng Dong



Specific Heat Of Solids:

Specific Heat of Solids A. Cezairliyan, 1988 Band 2 *Specific Heats and Enthalpies of Technical Solids at Low Temperatures* Robert Joseph Corruccini, John J. Gniewek, 1960 **Measurement of the Specific Heat of Solids at High Temperatures** Edwin Irle Griggs, 1962 **Thermophysical Properties of Matter** Y. S. Touloukian, 1995-12-31

Cryogenic Heat Transfer Randall F. Barron, Gregory F. Nellis, 2017-12-19 Cryogenic Heat Transfer Second Edition continues to address specific heat transfer problems that occur in the cryogenic temperature range where there are distinct differences from conventional heat transfer problems This updated version examines the use of computer aided design in cryogenic engineering and emphasizes commonly used computer programs to address modern cryogenic heat transfer problems It introduces additional topics in cryogenic heat transfer that include latent heat expressions lumped capacity transient heat transfer thermal stresses Laplace transform solutions oscillating flow heat transfer and computer aided heat exchanger design It also includes new examples and homework problems throughout the book and provides ample references for further study New in the Second Edition Expands on thermal properties at cryogenic temperatures to include latent heats and superfluid helium Develops the material on conduction heat transfer and divides it into four separate chapters to facilitate understanding of the separate features and computational techniques in conduction heat transfer Introduces EES Engineering Equation Solver a computer aided design tool and other computer applications such as Maple Describes special features of heat transfer at cryogenic temperatures such as analysis with variable thermal properties heat transfer in the near critical region Kapitza conductance and network analysis for free molecular heat transfer Includes design procedures for cryogenic heat exchangers Cryogenic Heat Transfer Second Edition discusses the unique problems surrounding conduction heat transfer at cryogenic temperatures This second edition incorporates various computational software methods and provides expanded and updated topics concepts and applications throughout The book is designed as a textbook for students interested in thermal problems occurring at cryogenic temperatures and also serves as reference on heat transfer material for practicing cryogenic engineers **Handbook of Food Science, Technology, and Engineering** Yiu H. Hui, 2006 *The Oxford Solid State Basics* Steven H. Simon, 2013-06-21 The study of solids is one of the richest most exciting and most successful branches of physics While the subject of solid state physics is often viewed as dry and tedious this new book presents the topic instead as an exciting exposition of fundamental principles and great intellectual breakthroughs Beginning with a discussion of how the study of heat capacity of solids ushered in the quantum revolution the author presents the key ideas of the field while emphasizing the deep underlying concepts The book begins with a discussion of the Einstein Debye model of specific heat and the Drude Sommerfeld theories of electrons in solids which can all be understood without reference to any underlying crystal structure The failures of these theories force a more serious investigation of microscopics Many of the key ideas about waves in solids are then introduced using one dimensional models

in order to convey concepts without getting bogged down with details Only then does the book turn to consider real materials Chemical bonding is introduced and then atoms can be bonded together to crystal structures and reciprocal space results Diffraction experiments as the central application of these ideas are discussed in great detail From there the connection is made to electron wave diffraction in solids and how it results in electronic band structure The natural culmination of this thread is the triumph of semiconductor physics and devices The final section of the book considers magnetism in order to discuss a range of deeper concepts The failures of band theory due to electron interaction spontaneous magnetic orders and mean field theories are presented well Finally the book gives a brief exposition of the Hubbard model that undergraduates can understand The book presents all of this material in a clear fashion dense with explanatory or just plain entertaining footnotes This may be the best introductory book for learning solid state physics It is certainly the most fun to read

Solid State Physics Joginder Singh Galsin, 2019-02-23 Solid State Physics An Introduction to Theory presents an intermediate quantum approach to the properties of solids Through this lens the text explores different properties such as lattice electronic elastic thermal dielectric magnetic semiconducting superconducting and optical and transport properties along with the structure of crystalline solids The work presents the general theory for most of the properties of crystalline solids along with the results for one two and three dimensional solids in particular cases It also includes a brief description of emerging topics such as the quantum hall effect and high superconductivity Building from fundamental principles and requiring only a minimal mathematical background the book includes illustrative images and solved problems in all chapters to support student understanding Provides an introduction to recent topics such as the quantum hall effect high superconductivity and nanomaterials Utilizes the Dirac notation to highlight the physics contained in the mathematics in an appropriate and succinct manner Includes many figures and solved problems throughout all chapters to provide a deeper understanding for students Offers topics of particular interest to engineering students such as elasticity in solids dislocations polymers point defects and nanomaterials

Thermal Properties of Solids at Room and Cryogenic Temperatures Guglielmo Ventura, Mauro Perfetti, 2014-06-23 The minimum temperature in the natural universe is 2.7 K Laboratory refrigerators can reach temperatures in the microkelvin range Modern industrial refrigerators cool foods at 200 K whereas space mission payloads must be capable of working at temperatures as low as 20 K Superconducting magnets used for NMR work at 4.2 K Hence the properties of materials must be accurately known also at cryogenic temperatures This book provides a guide for engineers physicists chemists technicians who wish to approach the field of low temperature material properties The focus is on the thermal properties and a large spectrum of experimental cases is reported The book presents updated tables of low temperature data on materials and a thorough bibliography supplements any further research Key Features include Detailed technical description of experiments Description of the newest cryogenic apparatus Offers data on cryogenic properties of the latest new materials Current reference review

Solid State Physics R. J. Singh, 2012 Solid state physics forms an

important part of the undergraduate syllabi of physics in most of the universities. The existing competing books by Indian authors have too complex technical language which makes them abstractive to Indian students who use English as their secondary language. Solid State Physics is written as per the core module syllabus of the major universities and targets undergraduate B Sc students. The book uses lecture style in explaining the concepts which would facilitate easy understanding of the concepts. The topics have been dealt with precision and provide adequate knowledge of the subject.

Public Health Reports, 1955 *Health Services Reports*, 1955 *Thermodynamics of Technical Gas-reactions* Fritz Haber, 1908 *The Practical Handbook of Compost Engineering* Roger Tim Haug, 2018-05-04. The Practical Handbook of Compost Engineering presents an in depth examination of the principles and practice of modern day composting. This comprehensive book covers compost science, engineering, design, operation, principles and practice, stressing a fundamental approach to analysis throughout. Biological, physical, chemical, thermodynamic and kinetic principles are covered to develop a unified analytical approach to analysis and an understanding of the process. A brief history of the development of composting systems which leads to descriptions of modern processes is presented. The Practical Handbook of Compost Engineering also discusses the elements of successful odor management at composting facilities including state of the art odor treatment and enhanced atmospheric dispersion. The book is excellent for all engineers, practitioners, plant operators, scientists, researchers and students in the field.

Solid State Physics Dr. Om Prakash Pahuja, 2005-12 **Solid State Physics, Solid State Device And Electronics.** C M Kachhava, 2003. This book is designed to cater the need of students of B Sc Pass and Hons students of various Indian universities on the basis of model curriculum recently proposed by Cdc of Ugc. The book comprises 569 figures, 266 examples, 233 problems and 336 objective questions distributed in 13 chapters. Each problem is followed by its answer. The inclusion of a large number of problems and review questions are aimed at evaluating the degree of conceptual comprehension a student has acquired as a result of studying the book. The solved examples are targetted to illustrate the theoretical ideals described in the text. Although the book is aimed to target B Sc students, yet chemists, material scientists and electrical engineers would find it useful not only in pursuing their studies but also in professional applications. The existence of sufficient number of objective questions are framed to help the student immensely to encounter competitive examinations like Net Slet Ics and State Civil Services.

Elementary Lessons in Heat Samuel Escue Tillman, 1892 **The Specific Heat of Solids at Constant Volume, and the Law of Dulong and Petit** Gilbert Newton Lewis, 1907 *Specific Heat* Yeram Sarkis Touloukian, 2013-12-04. In 1957 the Thermophysical Properties Research that about 100 journals are required to yield fifty Center TPRC of Purdue University under the percent. But that other fifty percent it is scattered leadership of its founder Professor Y S Touloukian through more than 3500 journals and other docu began to develop a coordinated experimental ments often items not readily identifiable or ob theoretical and literature review program covering tainable. Nearly 50 000 references are now in the a set of properties of

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