structure. The behavior of the electron beam in its focusing field, both constant and periodic, is considered in chapter 4, including the peculiar instabilities in hollow beams. In chapter 5 the production and collection of the electron beam outside the interaction space are dealt with. In the next section the author considers interaction and electron guns in crossed-field devices; for the appropriate large signal theory he refers to the original papers on this subject. In chapter 7 the feedback mechanism and the prevention of backward-wave oscillations are dealt with. The next chapter is devoted to the design of input and output transformers coupled to different slow-wave structures (including windows) and to some technological possibilities of their design. Chapter 9 deals with technology and materials of tube construction, cathode construction, and pumping techniques. In the last chapter measurement techniques related to the determination of cold- and hot-tube parameters are considered.

To a microwave tube engineer this book will fill an open space between Pierce's book and the wide-spread publications in different periodicals. This book will not be a textbook, but a workbook. It can be recommended to every microwave-tube engineer.

GASES IN VARIOUS PHASES

PHYSICS OF HIGH PRESSURES AND THE CONDENSED PHASE. A. Van Itterbeek, ed. 598 pp. (North-Holland, Amsterdam) John Wiley, New York, 1965. $22.50

by Carl W. Garland

The title of this collection of chapters by 21 different authors is quite a bit more general than its contents. The first ten chapters (about 75 percent of the material) are mostly concerned with the equilibrium properties of simple, liquified, and solidified gases at low temperatures and moderate pressures. Very little is said about more typical solids except for two chapters (65 pages) concerning the effect of pressure on superconductivity and the electrical properties of metals and semiconductors. In addition, some spectroscopic work is covered in two chapters (70 pages), which review the effect of pressure on electronic, infrared, and Raman spectra, primarily of gases. The most interesting aspect of that coverage is a good review of induced infrared absorption (with emphasis on hydrogen). These four chapters, at the end of the book, are only vaguely related to the initial material.

* * *

Carl W. Garland is an associate professor of chemistry at MIT and a specialist in physical chemistry.

The quality of the first ten chapters is extremely variable. Chapters 1–3 (which deal with various experimental aspects of high pressure work) are all disappointing. More than half of chapter 1 is devoted to the "theory and practice . . . of a thick-walled cylinder submitted to pressure"; chapter 2 contains a summary of empirical engineering data on many alloys used in "modern hardware programs such as cryogenic fueled missiles"; chapter 3 involves a survey of all the various methods of determining pVT data, arranged according to the ten principal laboratories in which this work has been done during the past 60 years. Chapters 4, 5, and 7 contain concise and critical reviews of pVT data, velocities of sound, and phase-equilibrium data for liquified and solidified gases. These chapters are well written and useful. There are also special chapters (8 and 9) on helium: a brief survey of liquid ^{3}He and ^{4}He under pressure, and an excellent presentation of the properties of solid ^{3}He and ^{4}He. Finally, there are chapter 6, which gives a brief but clear review of various theories of the liquid state, and chapter 10, which gives a superficial review of experimental methods of determining transport properties.

Why has this book been written and published? Some of the material is readily available elsewhere; some is unrelated to the general theme, and some does not merit special attention. The four or five best chapters would have made a more coherent and less expensive monograph with considerable appeal. Furthermore the book has been poorly edited. There is an annoying repetition of material on experimental pVT methods in chapters 1, 3, and 4; and there

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March 1966

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HARVEY E. WHITE,

University of California (Berkeley)

Modern College Physics, a widely adopted text for introductory physics courses, will soon be available in an extensively revised Fifth Edition. The author has added completely new chapters on Electric and Magnetic Dipole Moments; Interferometers and Lasers; Special Atomic and Nuclear Effects; and Atomic Field Theory and World Lines. The subject of rocket engines has been expanded to include engine thrust, specific impulse, and rocket fuels; and the delta notation has been introduced at intervals to form a better introduction to more advanced courses which use calculus. Another feature includes the concept of energy levels in mechanics to provide an introduction to energy levels in atoms and nuclei. The treatment of solid state physics and semiconductors has been expanded along with the special theory of relativity, nuclear conservation laws, and elementary particles.

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is considerable overlap in the presentation of theories of the liquid state in chapters 4, 6, and 7. A reasonable editorial effort should have eliminated these defects.

LECTURES AT HEIDELBERG

PHYSIKALISCHE CHEMIE. Ein Vorlesungskurs (2nd ed.). By Klaus Schäfer. 432 pp. Springer-Verlag, Berlin and New York, 1964. DM 36.

by M. E. Straumanis

Klaus Schäfer is a well known professor of physical chemistry at the University of Heidelberg. The book originated from lectures given to students of chemistry there.

The outline of the book follows the same pattern as proposed by the School of Eucken. A large part of the text (about 150 pages) is devoted to thermodynamics, especially chemical thermodynamics, whereby the calorie is still used, although the value in joules is mostly added. However, the other parts of physical chemistry are not at all neglected: following thermodynamics, on about 50 pages electrochemistry is discussed, and then on 20 pages chemical kinetics. The first 56 pages of the book are devoted, according to the old pattern, to gas laws, liquids, diluted solutions, and the kinetic theory. However, already on page 13, Maxwell's velocity distribution law is introduced.

The last 142 pages deal with the structure of matter, starting with the old quantum theory of atoms, and continuing with wave mechanics (de Broglie, Heisenberg, Dirac, Schrödinger), in application to various chemical bonding problems, such as formation of molecules, organic compounds, and crystal lattices, including the structure of metals. Some facts and thoughts concerning nuclear chemistry, nuclear energy, and the structure of nuclei are added.

There is no colloid and surface chemistry, no photochemistry, no x-ray analysis, and there are no phase diagrams, since these topics are covered in separate, special courses in Germany. No exercises are given in the book, although the application of many equations is sufficiently explained.

The book is very concise and uses mathematics extensively. There is hardly a page without equations and there are no superfluous words in the text. All mathematical expressions are given in a form which permits their derivation. Hence, the mathematical requirements are not low: one has to have a good knowledge of the operations of differentiation and integration, differential equations, and analytical geometry. However, the author warns the student not to overestimate the significance of the mathematical tool in its application to physical chemistry.

It seems to the reviewer that in some parts of the book, the mathematical language is too heavy for a chemistry student, but the difficulty is balanced by the very clear writing and appropriate explanations in the text. The book can be recommended to those, who in addition to the requirements mentioned above, have a sufficient knowledge of German. There are no bibliography and no author index in the book. It is well printed and makes, like many other Springer editions, a good impression.

* * *

Professor Straumanis, who is now at the University of Missouri at Rolla, was for many years a professor of chemistry at the University of Latvia. During this time he worked and studied in Germany on a number of occasions.

THE PUNISHMENT FITS THE CRIME

THE NEUTRON BEAM MURDER. By Terry Johnson King. 190 pp. Abelard-Schumann New York, 1965. $3.50.

by Dietrick E. Thomsen

Murder by neutron beam is one of the more appalling possibilities provided by modern technology to the vindictive and envious. It is not difficult to accomplish if the victim is doing an irradiation experiment at a reactor and the murderer can get in and secretly replace the beam shielding with balsa dummies. It might also provide nontraditional difficulties for coroners and other forensic physicians, but in this novel they do not get into the act. From the first page, the reader knows who the murderer is, and the interest is on the means he uses to accomplish his objective (the crime occurs about halfway through the book) and what happens afterward. Such detective work as occurs is done ad hoc by, of all people, a university vice president.

Mrs. King's novel differs from most of the genre in another respect: It is not simply an amusing criminal mystery; it has also the aspects of a medieval morality play. The author is the wife of a nuclear engineer at the University of Miami and seems to have had much opportunity to become familiar with the soul searchings of scientists about their responsibility for the use of the destructive inventions of recent years. She has written something of a nightmare for these people.

Houston Rutherford, chairman of the physics department in a fictional Florida university, is a man of peace and goodwill. In the same department is Rutherford's villain and victim, one Crozier. Crozier is working on a way to seed nuclear bombs with radioactive cobalt, thereby to kill and overkill.

Rutherford thinks that Crozier will become director of a new institute and gain the opportunity to push his nefarious research to the ultimate limit, and this is likely to mean doom for the human race. Rutherford decides to kill Crozier. The horror in the story arises from contemplation of the evil that a well meaning man can do when he once decides that the salvation of the world depends on him and loses trust in the good intentions of his fellows.

The book is not likely to get any prizes for style, but Mrs. King's prose is easy reading when she keeps it tight. When she lets it go, the result is sometimes baroque. The dialogue occasionally sounds a little contrived too. Her people sometimes talk as if they were in a movie instead of life. Nevertheless, it is an engaging and readable book. The plotting is good; very few occurences are suspected beforehand, and the end is something of a poetic-justice reverse twist for a man of Rutherford's character.

* * *

Dietrick E. Thomsen is editor of the PHYSICS TODAY *book department.*