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Book Reviews

The Classical Atom. By F. L. Friedman and L. Sartori, Addison-Wesley, Reading Mass. (1965). 118 pages, paperback.

This is an interesting little book, the first volume in a projected series on the Origins of Quantum Physics. It is not a textbook in the usual sense, nor an historical development of the subject, but it does contain a large amount of historical material beginning with the concept of the atom and ending with the Rutherford nuclear atom. Those already familiar with atomic physics will find perusal of specific topics an interesting way of using this book. For example, Chap. 3 contains a very extensive account of the Thomson atom, much more than is available in most texts on atomic physics. There are a few direct quotations from writings by J. J. Thomson, and one from a book by Sir Oliver Lodge published in 1906. This last quotation contains a discussion of five possible views on the structure of the hydrogen atom. I will quote just one sentence from this: "A fifth view of the atom would regard it as a central 'sun' of extremely concentrated positive electricity at the center, with a multitude of electrons revolving in astronomical orbits, like asteroids, within its range of attraction."

There are three chapters in the book. The first is a short one which discusses very briefly the determination of the electronic charge by Millikan, and the determination of the Avogadro number by J. Perrin through his experiments on Brownian motion. The second chapter, "Some Successes and Failures of Nineteenth Century Atomism," treats some special topics in statistical mechanics. The mathematical level is higher in this chapter than in the two other chapters. It contains a derivation of the equation-of-state of an ideal gas by the use of virial theorems, a discussion of random walks, fluctuation phenomena, and a nice derivation of the Maxwell-Boltzmann distribution law with a description of an experimental verification of such a distribution. There is also a discussion of the equipartition theorem and its application to the specific heats of gases and solids. Some of the successes of this theorem are discussed, as well as its limitations.

The third chapter, on "Atomic Constituents and Atomic Nuclei," contains material on the determination of e/m for electrons by J. J. Thomson and the beginnings of discussions on the structure of the atom. There is a brief discussion of mass spectrometry beginning with the discovery of canal rays and ending with a modern table of masses of isotopes using ^{12}C as the standard. This chapter contains an extensive discussion of the work of Rutherford's group on the single scattering of alpha particles that led to the Rutherford theory of the nuclear atom. The equations for the scattering of alpha particles are derived in a short Appendix.

There is a list of references, mostly to original papers, at the end of each chapter. Some of these references go back more than a century (1860 is the earliest). There are some challenging problems at the ends of Chaps. 2 and 3.

Such important topics as x rays, photoelectric effect, and atomic spectra receive only very brief mention, but perhaps more extensive treatments will appear in succeeding volumes.

This book is a worthwhile addition to one's library; it will also be found very useful as a supplementary text in an undergraduate course in atomic physics. It is well written and attractively produced.

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About the Reviewer: Henry Semat has been a member of the Physics Department at The City College for many years and is, in fact, also an alumnus. He did his graduate studies at Columbia University in x-ray spectroscopy. But, basically, Professor Semat is a teacher, as attested by the achievements of his many former students now prominent in physics. He is also the author of widely used texts for introductory and advanced courses.

Chemical Effects of Nuclear Transformations. The proceedings of a symposium held in Vienna, 7–11 December, 1964, organized by the International Atomic Energy Agency in collaboration with the International Union of Pure and Applied Chemistry. Published by the IAEA in Vienna (1965), 2 volumes, Vol. I., pp. 442, $9.00; Vol. II., pp. 558, $11.00.

An earlier symposium on this subject took place in Prague in 1960 (IAEA, STI/PUB 34). In these two volumes, the proceedings of the second symposium (some 64 papers) are recorded; thus, clearly this has been a very active corner of science in recent years.

By requiring the contributors to submit their papers in a standardized form and to complete any corrections to their text at the symposium, the IAEA has been able to publish the proceedings with commendable speed. Contributions to the discussions were recorded and are published after each group of papers. It is true that neither authors nor speakers had the opportunity to proofread their contributions, but such sacrifices seem justifiable in the interests of speed of publication of this kind of material. Certainly, the density of typographical errors in the text is not noticeably higher than usual.

Perusing these volumes, the reader gains an accurate and up-to-date impression of the subject. He soon realizes that the contributors are pursuing a number of very different physico-chemical objectives but that they find common