



Basic Vacuum Technology 2nd Edition, A. Chambers, R.K. Fitch, and B.S. Halliday, Institute of Physics Publishing, 1998, pp: 189, ISBN 0 7503 0495 2 (hc); Price: US\$45

In the preface, the authors identify the need for a modern book that covers a broad range of topics relevant to vacuum technology that is suitable for readers who need to become experts in the field. These authors attempt to fill the void with their book entitled **Basic Vacuum Technology**. In this reviewer's opinion, too much has been sacrificed in the effort to make this book affordable.

The book has eight chapters and does cover a broad range of topics. The opening chapter reviews some basic principles of gases and assumes results from the Kinetic theory of gases without derivation. This is the only prior knowledge assumed and this book will be easily accessible to anyone with a solid foundation in undergraduate thermodynamics. The chapter concludes by drawing a distinction between continuum states of a gas, in which the dynamics are dominated by molecule-molecule collisions, and the molecular state where the mean free path of the molecules exceeds the container dimensions. Some important consequences of the two states are highlighted.

The second chapter describes the pumping process and limiting factors such as outgassing and pumping speeds. Chapter three outlines the operating principles behind the most commonly used pumps and typical applications in which the various pumps are used. The fifth chapter is a survey of the various vacuum gauges used to measure pressure. The authors are careful to point out that the absolute calibration of certain gauges, such as thermal conductivity and ionization gauges, depend on the makeup of residual gases being measured. This chapter also includes a short, but nice section regarding the absolute calibration of vacuum gauges.

Chapters five and six address vacuum materials and the cleaning and handling of those materials. Low temperature physicists, for example, should be aware that at room temperature glass is permeable to helium gas and those working at ultra-high vacuum (UHV) must only use materials with low outgassing rates and that can be safely baked. The book closes with two very short chapters. The first deals with the important topic of leak detection and the second with archetypical vacuum systems, from a simple low vacuum rotary pumped system to a complete UHV system.

This broad range of topics is covered in a mere 160 pages with 20+ pages of appendices. As a result none of the topics are covered in great detail. The authors do give numerous references to more detailed material at the end of each chapter. The text of the book is accompanied by plenty of black and white figures. Unfortunately, the figure captions are kept to a bare minimum forcing to reader to search through the main text for a detailed description. Even then, the detail in the figures sometimes exceeds the detail presented in the text. This book is not a text and as such does not offer any exercises to the reader. There are occasional example calculations worked out in the text, especially near the beginning of the book, but these are often borderline trivial.

This book does succeed in introducing all of the major topics to be considered when designing a functional vacuum system. However, those looking to become experts in the field will be better served by a more advanced text. Those who are faced with designing a specific vacuum system, be it a UHV system or a gas handling system for a dilution refrigerator, will certainly benefit from a more specialized text.

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