

BOOK REVIEW

B. A. HANDS (Editor), **Cryogenic Engineering**. Academic Press, London, 1986, 494 pp.

OVER THE last few decades cryogenic engineering has been given wide attention, due to large-scale application in technology. In this book, edited by B. A. Hands, cryogenics has been defined as covering all processes and techniques occurring at temperatures below 120 K. This includes liquefied gases like natural gas, oxygen, etc. as well as applications using liquid helium. Studying the book this still means two rather distinct areas of cryoengineering with their own specific problems.

The increasing interest in cryoengineering certainly makes a book giving a comprehensive review very valuable. This book is a cooperative effort of a number of authors, each an expert in the field, and being responsible for one or two chapters. This reviewer tried by checking through the index if he could think of a subject that he considers to be relevant for the field and not included in the book. He did not find one case. The book can be considered to be rather complete in covering the field.

However, this has also a drawback, it covers many relevant topics but in most cases only superficially. For example in gas separation the equations for the enthalpy and mass balance for a theoretical plate are given. However, nothing is done with them. The McCabe-Thiele method is mentioned but its principles are not discussed. The heat transfer chapter gives a rather superficial discussion, for heat transfer no equations are given, only the relevant dimensionless groups

are defined, again nothing is done with them. For this the author is referred to the literature, the same holds for many other chapters. Of course it has been the aim of the editor to refer to standard textbooks, but this premise makes the book not directly useful for the practising engineer. The reviewer would have preferred a book of double the size giving more depth to the topics. Chapters on fundamentals of fluid flow, heat transfer and two-phase flow are included, however, a chapter on thermodynamics of low-temperature systems is missing. At two places in the book exergy considerations are mentioned, but no clear discussion of the principles is given. The book gives for each chapter a number of references for more detailed information. This is valuable and certainly needed in view of the character of the book. However, for many chapters most references are for literature from 1930 to 1970. Heat transfer below 10 K has only 2 references out of 34 from 1980. Still if one looks through a journal like *Cryogenics* over the last 7 years, especially for this field one sees that many important references are lacking.

The book gives a very wide coverage of the field. Next to the chapters already mentioned it covers properties of cryogenic fluids, safety, electrical conductors, construction and equipment, liquefaction, helium refrigeration and thermometry. From this point of view it can be used as an introductory textbook for engineers and students without previous experience in the field. For use as a handbook for the practising engineer it is less suitable.

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