

(Continued from page 9M)

variation of macroscopic quantities over a mean free path is not negligible. For the limiting case of the Knudsen gas there are striking differences with phenomena under moderate pressures. For instance in Couette flow the force does not depend upon the velocity gradient but rather on the velocity difference; the force depends linearly on the pressure, etc. The transition region between ordinary gas pressures and those for which Knudsen behaviour subsists has been the subject of several studies recently. As anticipated the results differ from those of classical hydrodynamics.

Despite this omission *Viscous Flow Theory* by Shih-I Pai is to be recommended to engineers and advanced students interested in the hydrodynamics of viscous compressible flow.

STUART A. RICE

Ion Exchange Resins, by Robert Kunin, John Wiley & Sons, Inc. 466 pages.

One of the first books on ion exchange, *Ion Exchange Resins* by Kunin and Myers, has been revised and doubled in length by Dr. Kunin. In the years since the first edition appeared, other books have been published which cover some portions of its subject more intensively. Still this volume is unique in its comprehensiveness.

The title of this book is not indicative of the range of its contents. A few chapters are devoted to the characteristics of anion and cation exchange resins and the synthesis of resins. A greater portion of the work deals with the technological aspects

of specific applications of ion exchange.

Because the book is so broad in its coverage one cannot expect to find depth in all areas. Engineers interested in ion exchange rate theory or the principles of fixed bed will be disappointed by the treatment of these topics. On the other hand those concerned with the operation of commercial ion-exchange equipment will find one of the new chapters, "Stability of ion exchange resins," especially valuable because it brings together much information which hitherto was available only piece-meal in service literature from the manufacturers of resins.

Some of the topics treated are highly specialized, so it is unlikely that any one reader will be interested in the entire book. This applies particularly to some of the new chapters on the treatment of sugar and glycerine, hydrometallurgic applications, water softening, and catalysis with ion exchange resins. There is also a chapter covering the subject of permselective membranes from electrochemical theory to the economics of the treatment of waste pickle liquor which uses membrane cells.

There are unfortunately a number of incorrectly listed references, and in one case there is discussion of a figure which does not appear. When one considers that over a thousand references are listed, these few mistakes do not seriously impair its usefulness.

This book will be a well-used reference in the library of any company in the process industries. It provides an excellent starting point for any reading on ion exchange.

W. A. SELKE

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