

LIQUID FILTRATION

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 ANN ARBOR SCIENCE

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By

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PREFACE

Liquid filtration is a fundamental unit operation extensively practiced throughout the chemical process, petroleum and allied industries. Technically, it involves the separation, removal and collection of a discrete phase of matter existing in a dispersed or colloidal state in suspension. This separation is most often performed in the presence of a complex media structure in which physical, physicochemical and/or electrokinetic forces interact.

Filtration as applied to liquid process streams can be for the purposes of recovering a valuable discrete phase product; recovering valuable continuum or liquid phase product; preconditioning either liquid process streams or solid, semisolid or emulsion phase materials; or removing unwanted discrete phase contaminants that may damage downstream process equipment or be harmful to the receiving/discharge environment.

Because of the diversified range of applications and properties of suspensions handled, a multitude of filtration equipment and techniques has evolved. Unfortunately, due to the complex hydrodynamics of filtration and its auxiliary operations, equipment design, selection and implementation are often confusing. Existing design methodologies are, for the most part, empirical. This empiricism has often led to mis-design or the implementation of equipment whose actual performance has fallen below anticipated operating demands.

This book is a state-of-the-art review of liquid filtration in the chemical process and allied industries. Interpretations of the phenomenological observations of the hydrodynamics of filtration are given in the hopes of establishing more theoretical and generalized bases for design methodology. Specific design and selection criteria are reviewed, and typical industrial problems and their solutions are presented. This volume marks the second in the series entitled *Chemical and Process Equipment Design*.

Several chapters have been prepared by specialists. These include Paul N. Cheremisinoff and Angelo LaMendola of New Jersey Institute of Technology (Chapter 14 on reverse osmosis), and Theodore Meltzer, Howard Green, Robert Williams and Charles Gelman of Gelman Sciences Inc. (Chapters 12,

13 and 15 on microporous membrane filtration and microfiltration). Finally, the authors extend their heartfelt gratitude to the many organizations that contributed time and materials to this volume.

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David S. Azbel

PREFACE

The purpose of this book is to provide a comprehensive overview of the state-of-the-art in the field of membrane technology. The book is intended for use as a text or reference for students, researchers, and engineers. The book is divided into two main parts. The first part, Chapters 1 through 10, covers the fundamentals of membrane technology, including the classification of membranes, the principles of membrane transport, and the design and operation of membrane systems. The second part, Chapters 11 through 15, covers the applications of membrane technology in various industries, including water treatment, food processing, and pharmaceuticals. The book is written in a clear and concise style, and includes numerous figures, tables, and references. The authors hope that this book will be a valuable resource for anyone interested in membrane technology.



Cheremisinoff



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