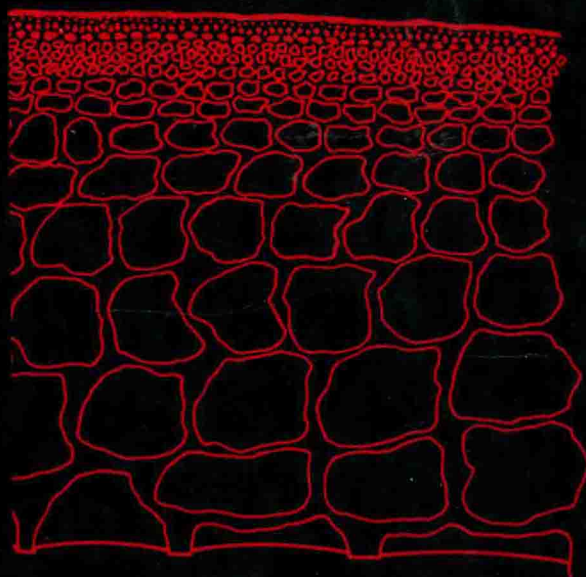


REVERSE OSMOSIS TECHNOLOGY

**Application for
High-Purity-Water Production**



**edited by
Bipin S. Parekh**

REVERSE OSMOSIS TECHNOLOGY

Applications for High-Purity-Water Production

edited by

Bipin S. Parekh

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*To all those who have contributed
to the development and advancement
of reverse osmosis technology*

Preface

The purpose of this book is to provide a comprehensive discussion of the application of reverse osmosis (RO) technology in a wide spectrum of water purification opportunities. Reverse osmosis is a well-established process in the production of potable water from brackish water and seawater. Within the last 10 years, RO has been applied for production of ultrahigh-purity water for the pharmaceutical industry, the research laboratory, the hemodialysis process, and the manufacture of integrated circuits in the electronics industry. Reverse osmosis has attained such a prominent role in these water purification areas because of its unique ability to remove ionic impurities, particulates and colloids, organics, microorganisms, and pyrogenic materials from water.

The development of an RO-based process for a specific application requires a proper combination of process components—membrane device, system design, and associated pretreatment and posttreatment. Obviously, options are available in the choice of these components. Recent advances in membrane research have produced a variety of RO membranes with excellent environmental resistance. Advances in the methods of analysis and detection of water-borne impurities now allow detection of inorganic and organic contaminants down to levels of parts per billion and parts per trillion. Reverse osmosis has become an indispensable part of processes for producing such ultrahigh-purity waters.

The content of this book is divided into two broad categories. The first deals with the fundamentals of RO, RO device modeling, and fouling of membrane processes. The second category is the applications of RO—the major thrust of the book. Discussions of commercial RO membranes and modules and considerations for system design for brackish and seawater desalting lead into the role of RO for producing high-purity waters. A chapter is devoted to the adhesion of microorganisms on RO membranes. Microorganisms are most difficult to eliminate from high-purity water systems. The last chapter discusses the economics of reverse osmosis.

The contributors are highly regarded in the field of RO technology. Each chapter discusses a specific topic and stands on its own. However, some repetition of discussions is deliberately allowed. For example, pretreatment, commercial RO membranes, and system design concepts are mentioned more than once.

The book is aimed at engineers and scientists in the chemical process industry and in the research institutes/departments of industry and universities. It is my hope that this book will contribute to the better understanding of the role reverse osmosis plays in high-purity-water production.

I thank the authors for submitting their manuscripts on schedule. Without their contributions, this book would not have materialized. I also thank Millipore Corporation for allowing me the opportunity to edit this book. Special thanks are due to Drs. Leon Mir and Mauro Accomazzo for their encouragement and valuable comments. It has also been a pleasure to deal with the staff of Marcel Dekker, Inc.

Bipin S. Parekh

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REVERSE OSMOSIS TECHNOLOGY

Contents

<i>Preface</i>	v
<i>Contributors</i>	vii
 1. Fundamental Aspects of Reverse Osmosis	 1
<i>James M. Dickson</i>	
I. Introduction	2
II. Transport Models	9
III. Application of Transport Models	23
IV. Conclusion	43
Notation	44
References	48
 2. Commercial Reverse Osmosis Membranes and Modules	 53
<i>Anthony E. Allegrezza, Jr.</i>	
I. Introduction	53
II. Uses of Reverse Osmosis	54
III. Considerations for the Reverse Osmosis System	
Buyer	61
IV. Manufacturers' Specifications	91
 3. Modeling of Reverse Osmosis Membrane Devices	 121
<i>Mahendra R. Doshi</i>	
I. Introduction	121
II. Terminology	123
III. Tubular and Thin Channel Modules	124
IV. Hollow Fiber Module	125
V. Spiral-Wound Module	129
Appendix	133
Notation	136
References	138

4. Fouling in Membrane Processes	141
<i>John V. Lepore and Robert C. Ahlert</i>	
I. Introduction to Fouling Phenomena	142
II. Common Causes of Fouling	142
III. Modeling	156
IV. Predicting Fouling	164
V. Preventing Fouling	167
VI. Analogy to Fouling in Other Unit Operations	173
VII. Summary	173
Notation	174
References	178
5. Brackish and Seawater Desalting	185
<i>Albino Ko and Donald B. Guy</i>	
I. Introduction	186
II. Semipermeable Membranes	193
III. Modules	203
IV. Feed Water Requirements	208
V. Systems Design	225
VI. Systems Installation and Operation	240
VII. Dissolved Solids Rejections	264
VIII. Systems Cost Approximation	275
Notation	276
References	278
6. Electronic-Grade Water Production Using Reverse Osmosis Technology	279
<i>Clifford F. Frith, Jr.</i>	
I. Introduction	279
II. Semiconductor-Grade Water	280
III. Why Reverse Osmosis?	283
IV. Removal Efficiency	288
V. Total Organic Carbon Control	289
VI. Reverse Osmosis Applications	293
VII. Water System Design	299
VIII. Cleaning and Sanitization	304
IX. New Reverse Osmosis Applications	307
X. Summary	308
References	308
7. The Role of Reverse Osmosis in Production of Laboratory Water	311
<i>Yair Egozy, Jeffrey P. Denoncourt, and Gary C. Ganzi</i>	
I. Introduction	312
II. Contaminants in Water	314

III.	Purification Steps	316
IV.	System Approach to Water Purification	322
V.	Applications	325
VI.	Maintenance	329
VII.	Attainable Purity Levels	330
VIII.	Conclusion	344
	References	345
8.	Reverse Osmosis for Producing Pharmaceutical-Grade Waters	347
	<i>Paul L. Parise, Bipin S. Parekh, and Ronald T. Smith</i>	
I.	Introduction	348
II.	System Design	351
III.	Pretreatment	361
IV.	Sanitization	382
V.	Process Validation	387
VI.	Field Experience	391
VII.	Economic Considerations	394
VIII.	Conclusion	394
	References	395
9.	Pure Water by Reverse Osmosis for the Treatment of End-Stage Renal Disease	399
	<i>Gary C. Ganzi</i>	
I.	Introduction	400
II.	The Treatment of Kidney Dysfunction	400
III.	Water Quality Standards	407
IV.	Reverse Osmosis System Design and Operation	410
V.	Summary	421
	References	421
10.	Microbial Adhesion and Biofouling of Reverse Osmosis Membranes	429
	<i>Harry F. Ridgway, Jr.</i>	
I.	Introduction	430
II.	Effects of Membrane Biofouling	430
III.	Chemical Properties of Reverse Osmosis Biofilms	442
IV.	Microbiology of Reverse Osmosis Biofilms	446
V.	Kinetics and Mechanism of Bacterial Adhesion to RO Membranes	460
VI.	Bacterial Adhesion to Different RO Membranes	472
VII.	Summary and Concluding Remarks	474
	References	476

11. Factors Influencing the Economics of Reverse Osmosis	483
<i>James D. Birkett</i>	
I. Introduction	484
II. Capital Cost Components	485
III. Operating Cost Components	491
IV. Annual Costs	494
V. Water Costs	495
VI. Comments on Specific Examples	496
References	504
 <i>Index</i>	 505