

Contents

Contributors vi
Preface to the 22nd Edition xvii
Preface to the First Edition xviii

VOLUME 1

PART 1 THE SCIENCE OF PHARMACY

Section 1 INTRODUCTION

- | | | |
|---|---|----|
| 1 | Scope of Pharmacy | 5 |
| | <i>Phillip J. Schneider and Joseph L. Fink III</i> | |
| 2 | Evolution of Pharmacy | 11 |
| | <i>Gregory J. Higby</i> | |
| 3 | The New Drug Approval Process and Clinical Trial Design | 25 |
| | <i>Linda A. Felton and Dennis W. Raisch</i> | |
| 4 | Information Resources in Pharmacy and the Pharmaceutical Sciences | 37 |
| | <i>Robin H. Bogner and Sharon Giovenale</i> | |

Section 2 PHARMACEUTICAL CHEMISTRY

- | | | |
|----|--|-----|
| 5 | Inorganic Pharmaceutical Chemistry | 47 |
| | <i>Pardeep K. Gupta</i> | |
| 6 | Organic Pharmaceutical Chemistry | 71 |
| | <i>Jason Wallach, Boyenoh Gaye, and Adeboye Adejare</i> | |
| 7 | Natural Products | 103 |
| | <i>Ara H. DerMarderosian and Vidhan Jaiswal</i> | |
| 8 | Structure-Activity Relationships and Drug Design | 141 |
| | <i>Randy J. Zauhar and Eleonora Gianti</i> | |
| 9 | Pharmaceutical Profiling | 157 |
| | <i>Bi-Botti C. Youan</i> | |
| 10 | Prodrugs | 175 |
| | <i>Zeynep Ates-Alagoz and Adeboye Adejare</i> | |
| 11 | Fundamentals of Medical Radionuclides | 195 |
| | <i>Jeffrey P. Norenberg and William B. Hladik III</i> | |
| 12 | Drug Nomenclature—United States Adopted Names | 211 |
| | <i>Kevin G. Moores, Vicki R. Kee, and Nicola R. Sarrazin</i> | |

Section 3 PHARMACEUTICAL ANALYSIS AND QUALITY CONTROL

- | | | |
|----|--|-----|
| 13 | Analysis of Medicinals | 257 |
| | <i>Raymond D. Skwierczynski</i> | |
| 14 | Biological Testing | 277 |
| | <i>Gail Goodman-Snitkoff</i> | |
| 15 | Clinical Analysis | 291 |
| | <i>Cathy Y. Poon</i> | |
| 16 | Quality Assurance and Control | 327 |
| | <i>John H. Parker and John E. Enders</i> | |
| 17 | Stability of Pharmaceutical Products | 335 |
| | <i>Allan D. Bokser and Patrick B. O'Donnell</i> | |
| 18 | Bioavailability and Bioequivalency Testing | 349 |
| | <i>Steven B. Johnson</i> | |
| 19 | Chromatographic Methods of Analysis | 361 |
| | <i>Mandip Singh Sachdeva and Chandraiah Godugu</i> | |
| 20 | Spectroscopic Methods of Analysis | 399 |
| | <i>Anthony C. Moffat</i> | |
| 21 | Mass Spectrometric Methods of Analysis | 417 |
| | <i>David G. Watson</i> | |
| 22 | Dissolution | 433 |
| | <i>Vijai Kumar and Praveen Hiremath</i> | |

Section 4 PHARMACEUTICS

- | | | |
|----|---|-----|
| 23 | Modern-Day Drug Discovery and Development | 453 |
| | <i>Rick G. Schnatz</i> | |
| 24 | Metrology and Pharmaceutical Calculations | 465 |
| | <i>Roger L. Schnaare and Shelly J. Stockton</i> | |
| 25 | Statistics | 497 |
| | <i>Sanford Bolton and Richard Hirsch</i> | |
| 26 | Molecular Structure, Properties, and States of Matter | 541 |
| | <i>Thomas Rades, Keith C. Gordon, and Kirsten Graeser</i> | |
| 27 | Thermodynamics | 571 |
| | <i>Timothy S. Wiedmann</i> | |

28	Solutions and Phase Equilibria <i>Pardeep K. Gupta</i>	583	44	Medicated Topicals <i>Lawrence H. Block</i>	931
29	Separation Methods <i>Loyd V. Allen Jr.</i>	605	45	Oral Solid Dosage Forms <i>Ahmed Adel Sakr and Fars K. Alanazi</i>	947
30	Ionic Solutions and Electrolytic Equilibria <i>Barbara R. Conway</i>	621	46	Coating of Pharmaceutical Dosage Forms <i>Stuart C. Porter</i>	977
31	Tonicity, Osmoticity, Osmolality, Osmolarity <i>Andrew Ingham and Cathy Y. Poon</i>	641	47	Oral Modified-Release Drug Delivery Systems <i>Ali R. Rajabi-Siahboomi, Manish S. Rane, and Linda A. Felton</i>	989
32	Chemical Kinetics <i>Rodney J. Wigent</i>	665	48	Aerosols <i>John J. Sciarra and Christopher J. Sciarra</i>	999
33	Complex Formation <i>Thorsteinn Loftsson and Marcus E. Brewster</i>	681	49	Biotechnology and Drugs <i>Ara H. DerMarderosian and Zhiyu Li</i>	1017
34	Interfacial Phenomena <i>Paul M. Bummer and Yvonne Perrie</i>	693	50	Pharmaceutical Packaging <i>C. Jeanne Taborsky and Kathleen Deiss</i>	1033
35	Colloidal Dispersions <i>Bill J. Bowman, Clyde M. Ofner III, Hans Schott, and Yvonne Perrie</i>	707	51	Pharmaceutical Excipients <i>William J. Reilly Jr.</i>	1049
36	Coarse Dispersions <i>James Swarbrick, Joseph T. Rubino, and Orapin P. Rubino</i>	735	Section 6 PHARMACOKINETICS AND PHARMACODYNAMICS		
37	Rheology <i>Lawrence H. Block</i>	757	52	Basic Pharmacokinetics and Pharmacodynamics <i>Raymond E. Galinsky and Craig K. Svensson</i>	1073
Section 5 PHARMACEUTICAL DOSAGE FORMS: MANUFACTURING AND COMPOUNDING			53	Drug Action and Effect <i>Donald N. Franz</i>	1095
38	Powders <i>Yi-Bo Wang and Robert O. Williams III</i>	777	54	Drug Absorption, Distribution, Metabolism, and Excretion <i>Michael R. Franklin</i>	1107
39	Solutions, Emulsions, Suspensions, and Extracts <i>Michael M. Crowley</i>	801	55	Clinical Pharmacokinetics and Pharmacodynamics <i>Paul M. Beringer and Michael E. Winter</i>	1123
40	Sterilization Processes and Sterility Assurance <i>James Agalloco, William G. Lindboe Jr., and Russell E. Madsen</i>	835	56	Principles of Immunology <i>Susie H. Park and Stan G. Louie</i>	1139
41	Parenteral Preparations <i>Michael J. Akers</i>	861	57	Pharmacogenomics <i>Thomas C. Kupiec and Craig Shimasaki</i>	1151
42	Pharmaceutical Compounding – USP <797> Sterile Preparations <i>Catherine Cone, Linda A. Felton, and Amy Bachyrycz</i>	899	58	Pharmacokinetics/Pharmacodynamics in Drug Development <i>George L. Drusano</i>	1181
43	Ophthalmic Preparations <i>Masood Chowhan, John C. Lang, and Paul Missel</i>	907	Monographs PHARMACEUTICAL AND MEDICINAL AGENTS		
				Pharmaceutical and Medicinal Agents	1191
				Pharmaceutical Excipients	1837
			Index		li

PART 2
THE PRACTICE OF PHARMACY
Section 7 **FUNDAMENTALS OF PHARMACY PRACTICE**

59	Application of Ethical Principles to Practice Dilemmas <i>E. J. Last and Amy Marie Haddad</i>	1857
60	Technology and Automation <i>Bill G. Felkey, Brent I. Fox, and Kenneth N. Barker</i>	1867
61	Clinical Drug Literature <i>Marie A. Abate</i>	1877
62	The Patient: Behavioral Determinants <i>Nathaniel M. Rickles and Bonnie L. Svarstad</i>	1893
63	Patient Communication <i>Peggy Piascik and Heidi M. Anderson</i>	1903
64	Patient Adherence <i>Ashley H. Vincent</i>	1917
65	Drug Education <i>Michael Montagne</i>	1929
66	Professional Communications <i>Amy Heck Sheehan, Robert D. Beckett, and Steven R. Abel</i>	1939
67	The Prescription <i>Stephanie L. Enz and Angela V. Ockerman</i>	1955
68	Providing a Framework for Ensuring Medication Use Safety <i>Matthew Grissinger and Donna Horn</i>	1971
69	Adverse Drug Reactions <i>Robert K. Middleton</i>	2013
70	Drug Interactions <i>Christopher A. Thomas</i>	2023
71	Poison Control <i>F. Lee Cantrell and Sean Patrick Nordt</i>	2039
72	Medication Disposal <i>Amy Sutton Peak and Annette McFarland</i>	2049
73	Surgical Supplies <i>Thomas A. Barbolt and Sylvia H. Liu</i>	2055
74	Health Accessories <i>Gerald W. Deom, Matthew C. Osterhaus, and Steven T. Simenson</i>	2067

Section 8 **THE SCOPE OF PHARMACY PRACTICE**

75	The Entrepreneurial and Intrapreneurial Pharmacist <i>Ronald Hadsall, Randall Seifert, and Lowell J. Anderson</i>	2101
76	The Practice of Community Pharmacy <i>Jay D. Currie and Stevie R. Veach</i>	2109
77	The Practice of Health Systems Pharmacy <i>Pamela K. Phelps, Rowell Daniels, and Mark Thomas</i>	2115
78	Pharmacy Practice in Industry: Potential Roles for Pharmacists <i>Paul L. Pluta, Richard Poska, and Aldona T. Matalonis</i>	2133
79	Pharmacists in Government <i>Arthur J. Lawrence, William A. Hess, and Yiyang Tsai</i>	2143
80	Pharmacists and Public Health <i>Timothy J. Ives and John M. Conry</i>	2157
81	Consultant Pharmacy Practice <i>Sean M. Jeffery</i>	2173
82	Nuclear Pharmacy Practice <i>James A. Ponto and Stanley M. Shaw</i>	2183
83	Home Infusion Pharmacy Practice <i>Anna Nowobilski-Vasilios</i>	2199
84	Specialty Pharmacy <i>Hetty A. Lima</i>	2215
85	Pharmacists in Academia <i>Neal J. Benedict and David F. Kisor</i>	2229
86	Nutrition in Pharmacy Practice <i>Kathleen M. Gura, Ginger Langley, and Anne M. Tucker</i>	2235
87	Nutrients and Associated Substances <i>Joseph Boullata</i>	2273
88	Veterinary Pharmacy <i>Gigi Davidson and Dinah G. Jordan</i>	2301
89	Extemporaneous Prescription Compounding <i>Loyd V. Allen Jr.</i>	2311
90	Pesticides <i>Mark G. Robson, Ara H. DerMarderosian, and Marie Christine Poulsen</i>	2329

Section 9	SOCIAL, BEHAVIORAL, ECONOMIC, AND ADMINISTRATIVE SCIENCES	106	Complementary and Alternative Medical Healthcare	2575
91	Laws Governing Pharmacy <i>Joseph L. Fink III</i>	2353	<i>Catherine Ulbricht, Connie Grauds, and Ara H. DerMarderosian</i>	
92	Pharmacoeconomics <i>William F. McGhan</i>	2395		
93	Community Pharmacy Economics and Management <i>Donna West-Strum</i>	2409		
94	Product Recalls and Withdrawals and Disposal of Unused Medicines <i>Michael R. McConnell and Michael Rozembajgier</i>	2427		
95	Marketing Pharmacy Care Services <i>David A. Holdford</i>	2441		
96	Clinical Pharmacy Services <i>Becky Armor and Kelly Epplen</i>	2449		
97	Pharmaceutical Risk Management <i>Louis A. Morris, Eva Lydick, and Marsha K. Millonig</i>	2457		
98	Pharmacoepidemiology and Pharmacovigilance <i>Michael D. Murray</i>	2467		
99	Integrated Health Care Delivery Systems <i>Mark Conklin and Jeffrey Newell</i>	2477		
Section 10	PATIENT CARE			
100	Pharmacists and Disease State Management <i>James Palmieri and Yvette J. Crockell</i>	2497		
101	Development of a Pharmacy Care Plan and Patient Problem Solving <i>Bradley C. Cannon, Sheila Allen, and Kristen L. Goliak</i>	2505		
102	Specialization in Pharmacy Practice <i>Robert L. Talbert and William M. Ellis</i>	2513		
103	Ambulatory Care Pharmacy Practice <i>Stuart T. Haines and Seena L. Haines</i>	2523		
104	Self-Care <i>W. Steven Pray</i>	2541		
105	Diagnostic Self-Care <i>Marlon Honeywell and Tara M. Jenkins</i>	2551		
		107	Preventive Care	2583
			<i>Nancy L. Shapiro and Adam J. Bursua</i>	
		108	Substance Abuse Care	2613
			<i>Jeffrey N. Baldwin</i>	
		109	Emergency Medicine Pharmacy Practice	2621
			<i>Melinda J. Ortmann and Umbreen Idrees Murtaza</i>	
		110	Pediatric Pharmacy Practice	2629
			<i>Cathy Y. Poon and Carlton K. K. Lee</i>	
		111	Psychiatric Pharmacy	2637
			<i>Matthew A. Fuller and Sara Dugan</i>	
		112	Transplant Pharmacy Practice	2639
			<i>Lindsey A. Pote and Lindsey Lombardi Thomas</i>	
		113	Pharmacogenomics in Pharmacy Practice	2647
			<i>Grace M. Kuo, Kelly C. Lee, and Joseph D. Ma</i>	
		114	Critical Care Pharmacy Practice	2659
			<i>John J. Lewin III and John W. Devlin</i>	
		115	Infectious Diseases Pharmacy Practice	2667
			<i>George P. Allen and Andrea Deschambeault</i>	
		116	Pain and Palliative Care	2675
			<i>Julie Waldfogel and Suzanne Amato Nesbit</i>	
		117	Assessing Pharmacy-Related Quality of Care	2685
			<i>Ana Lucia Hincapie, Neil J. MacKinnon, David P. Nau, and Terri L. Warholak</i>	
		118	Long-term Care	2695
			<i>Carol A. Ott and Elayne D. Ansara</i>	
		119	Chronic Wound Care	2703
			<i>Mathew Thambi</i>	
		120	Tobacco Use Disorder	2713
			<i>Lori A. Wilken and Susan R. Winkler</i>	
		Index		li