

Remington's  
Pharmaceutical  
Sciences

*100 YEARS*

**17<sup>TH</sup>**  
EDITION

# Remington's

**ALFONSO R GENNARO**

*Editor, and Chairman  
of the Editorial Board*

# Pharmaceutical Sciences

1985

MACK PUBLISHING COMPANY

Entered according to Act of Congress, in the year 1885 by Joseph P Remington,  
in the Office of the Librarian of Congress, at Washington, DC

Copyright 1889, 1894, 1905, 1907, 1917, by Joseph P Remington

Copyright 1926, 1936, by Joseph P Remington Estate

Copyright 1948, 1951, by The Philadelphia College of Pharmacy and Science

Copyright © 1956, 1960, 1965, 1970, 1975, 1980, 1985, by The Philadelphia College of Pharmacy and  
Science

*All Rights Reserved*

Library of Congress Catalog Card No 60-53334

ISBN 0-912734-03-5

*The use of portions of the text of USP XX, NF XV, and USAN and the USP Dictionary of Drug Names is by permission of the USP Convention. The Convention is not responsible for any inaccuracy of quotation or for any false or misleading implication that may arise from separation of excerpts from the original context or by obsolescence resulting from publication of a supplement.*

*NOTICE—This text is not intended to represent, nor shall it be interpreted to be, the equivalent of or a substitute for the official United States Pharmacopeia (USP) and/or the National Formulary (NF). In the event of any difference or discrepancy between the current official USP or NF standards of strength, quality, purity, packaging and labeling for drugs and representations of them herein, the context and effect of the official compendia shall prevail.*

*Printed in the United States of America by the Mack Printing Company, Easton, Pennsylvania*

# Table of Contents

<b>Part 1    Orientation</b>			
1	Scope . . . . .	3	
2	Evolution of Pharmacy . . . . .	8	
3	Ethics . . . . .	19	
4	Pharmacists in Practice . . . . .	27	
5	Pharmacists in Industry . . . . .	34	
6	Pharmacists in Government . . . . .	42	
7	Drug Information . . . . .	49	
8	Research . . . . .	59	
<b>Part 2    Pharmaceutics</b>			
9	Metrology and Calculation . . . . .	69	
10	Statistics . . . . .	104	
11	Computer Science . . . . .	140	
12	Calculus . . . . .	148	
13	Molecular Structure, Properties, and States of Matter . . . . .	161	
14	Complexation . . . . .	186	
15	Thermodynamics . . . . .	198	
16	Solutions and Phase Equilibria . . . . .	207	
17	Ionic Solutions and Electrolytic Equilibria . . . . .	230	
18	Reaction Kinetics . . . . .	249	
19	Interfacial Phenomena . . . . .	258	
20	Colloidal Dispersions . . . . .	271	
21	Particle Phenomena and Coarse Dispersions . . . . .	301	
22	Rheology . . . . .	330	
<b>Part 3    Pharmaceutical Chemistry</b>			
23	Inorganic Pharmaceutical Chemistry . . . . .	349	
24	Organic Pharmaceutical Chemistry . . . . .	374	
25	Natural Products . . . . .	397	
26	Drug Nomenclature—United States Adopted Names . . . . .	428	
27	Structure-Activity Relationship and Drug Design . . . . .	435	
<b>Part 4    Radioisotopes in Pharmacy and Medicine</b>			
28	Fundamentals of Radioisotopes . . . . .	453	
29	Medical Applications of Radioisotopes . . . . .	471	
<b>Part 5    Testing and Analysis</b>			
30	Analysis of Medicinals . . . . .	503	
31	Biological Testing . . . . .	550	
32	Clinical Analysis . . . . .	559	
33	Chromatography . . . . .	593	
34	Instrumental Methods of Analysis . . . . .	619	
35	Dissolution . . . . .	653	
<b>Part 6    Pharmaceutical and Medicinal Agents</b>			
36	Diseases: Manifestations and Pathophysiology . . . . .	669	
37	Drug Absorption, Action, and Disposition . . . . .	713	
38	Basic Pharmacokinetics . . . . .	741	
39	Principles of Clinical Pharmacokinetics . . . . .	762	
40	Topical Drugs . . . . .	773	
41	Gastrointestinal Drugs . . . . .	792	
42	Blood, Fluids, Electrolytes, and Hematologic Drugs . . . . .	816	
43	Cardiovascular Drugs . . . . .	816	
44	Respiratory Drugs . . . . .	866	
45	Sympathomimetic Drugs . . . . .	876	
46	Cholinomimetic (Parasympathomimetic) Drugs . . . . .	894	
47	Adrenergic and Adrenergic Neuron Blocking Drugs . . . . .	902	
48	Antimuscarinic and Antispasmodic Drugs . . . . .	911	
49	Skeletal Muscle Relaxants . . . . .	921	
50	Diuretic Drugs . . . . .	933	
51	Uterine and Antimigraine Drugs . . . . .	946	
52	Hormones . . . . .	951	
53	Vitamins and Other Nutrients . . . . .	1002	
54	Enzymes . . . . .	1035	
55	General Anesthetics . . . . .	1039	
56	Local Anesthetics . . . . .	1048	
57	Sedatives and Hypnotics . . . . .	1059	
58	Antiepileptics . . . . .	1075	
59	Psychopharmacologic Agents . . . . .	1084	
60	Analgesics and Antipyretics . . . . .	1099	
61	Histamine and Antihistamines . . . . .	1124	
62	Central Nervous System Stimulants . . . . .	1133	
63	Antineoplastic and Immunosuppressive Drugs . . . . .	1139	
64	Antimicrobial Drugs . . . . .	1158	
65	Parasitocides . . . . .	1234	
66	Pesticides . . . . .	1241	
67	Diagnostic Drugs . . . . .	1264	
68	Pharmaceutical Necessities . . . . .	1278	
69	Adverse Effects of Drugs . . . . .	1321	
70	Pharmacogenetics . . . . .	1336	
71	Pharmacological Aspects of Drug Abuse . . . . .	1341	
72	Introduction of New Drugs . . . . .	1357	
<b>Part 7    Biological Products</b>			
73	Principles of Immunology . . . . .	1371	
74	Immunizing Agents and Diagnostic Skin Antigens . . . . .	1380	
75	Allergenic Extracts . . . . .	1396	
<b>Part 8    Pharmaceutical Preparations and Their Manufacture</b>			
76	Preformulation . . . . .	1409	
77	Bioavailability and Bioequivalency Testing . . . . .	1424	
78	Separation . . . . .	1432	
79	Sterilization . . . . .	1443	
80	Tonicity, Osmoticity, Osmolality, and Osmolarity . . . . .	1455	
81	Plastic Packaging Materials . . . . .	1473	
82	Stability of Pharmaceutical Products . . . . .	1478	
83	Quality Assurance and Control . . . . .	1487	
84	Solutions, Emulsions, Suspensions, and Extractives . . . . .	1492	
85	Parenteral Preparations . . . . .	1518	
86	Intravenous Admixtures . . . . .	1542	
87	Ophthalmic Preparations . . . . .	1553	
88	Medicated Applications . . . . .	1567	
89	Powders . . . . .	1585	
90	Oral Solid Dosage Forms . . . . .	1603	
91	Coating of Pharmaceutical Dosage Forms . . . . .	1633	
92	Sustained Release Drug Delivery Systems . . . . .	1644	
93	Aerosols . . . . .	1662	
<b>Part 9    Pharmaceutical Practice</b>			
94	Ambulatory Patient Care . . . . .	1681	
95	Institutional Patient Care . . . . .	1702	
96	Long-Term Care Facilities . . . . .	1702	

# Explore Litigation Insights

Docket Alarm provides insights to develop a more informed litigation strategy and the peace of mind of knowing you're on top of things.

## Real-Time Litigation Alerts



Keep your litigation team up-to-date with **real-time alerts** and advanced team management tools built for the enterprise, all while greatly reducing PACER spend.

Our comprehensive service means we can handle Federal, State, and Administrative courts across the country.

## Advanced Docket Research



With over 230 million records, Docket Alarm's cloud-native docket research platform finds what other services can't. Coverage includes Federal, State, plus PTAB, TTAB, ITC and NLRB decisions, all in one place.

Identify arguments that have been successful in the past with full text, pinpoint searching. Link to case law cited within any court document via Fastcase.

## Analytics At Your Fingertips



Learn what happened the last time a particular judge, opposing counsel or company faced cases similar to yours.

Advanced out-of-the-box PTAB and TTAB analytics are always at your fingertips.

## API

Docket Alarm offers a powerful API (application programming interface) to developers that want to integrate case filings into their apps.

## LAW FIRMS

Build custom dashboards for your attorneys and clients with live data direct from the court.

Automate many repetitive legal tasks like conflict checks, document management, and marketing.

## FINANCIAL INSTITUTIONS

Litigation and bankruptcy checks for companies and debtors.

## E-DISCOVERY AND LEGAL VENDORS

Sync your system to PACER to automate legal marketing.