



# Practical Process Research and Development

By Neal G. Anderson

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This book provides a comprehensive, step-by-step approach to organic process research and development in the pharmaceutical, fine chemical, and agricultural chemical industries. Process R&D describes the steps taken, following synthesis and evaluation, to bring key compounds to market in a cost-effective manner. More people are being hired for work in this area as increasing numbers of drug candidates are identified through combinatorial chemistry and high-throughput screening. The book is directed to industrial (primarily organic) chemists, and academicians (particularly those involved in a growing number of start-up companies) and students who need insight into industrial process R&D. Current books do not describe hands-on, step-by-step, approaches to solving process development problems, including route, reagent, and solvent selection; optimising catalytic reactions; chiral syntheses; and "green chemistry." "Practical Process Research and Development" will be a valuable resource for researchers, managers, and graduate students.

- Provides insights into generating rugged, practical, cost-effective processes for the chemical preparation of "small molecules"
- Breaks down process optimization into route, reagent and solvent selection, development of reaction conditions, workup, crystallizations and more
- Includes over 100 tips for rapid process development
- Presents guidelines for implementing and troubleshooting processes

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## **Practical Process Research and Development** By Neal G. Anderson Bibliography

- Sales Rank: #469979 in Books
- Published on: 2000-04-03
- Original language: English
- Number of items: 1
- Dimensions: 9.21" h x .88" w x 6.14" l, 1.35 pounds
- Binding: Hardcover
- 354 pages

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## Editorial Review

### Review

"... A must reference on every process chemists (both the novice and the experienced practitioner) desk. This will be required reading by all new chemists, engineers and analysts in my department." --**Sean T. Nugent, Searle Research and Development** "Practical Process Research & Development is just that, practical... Especially enjoyable are author Neal G. Anderson's pithy 'tips'... Fun chemistry throughout." --**CHEMICAL INNOVATION, June 2000** "The new volume by Dr. Anderson ranks with the very best on the subject covering almost all aspects of process research and development and scale up in an informative and readable manner. ...the many "Tips" given throughout the book are practical and informative and should be mandatory reading for all synthetic organic chemists, including those in research and discovery. ...could well become a standard text on the subject. Indeed, it is my recommendation that Process Chemistry departments throughout the industry buy two copies, one for themselves and one to help educate their colleagues in research/discovery. Many of the topics covered and the tips given in the book could also be of great use to anyone organizing organic chemistry practical courses for students. Perhaps the highest praise one can give this book is to say that Foreword by Barry Sharpless raises very high expectations and the book meets and at times exceed those expectations." --**ORGANIC PROCESS RESEARCH AND DEVELOPMENT, Vol.4, No.5, 2000** "Following enthusiastic Forwards by Barry Sharpless and Jerry Moniot, each chapter of the book addresses commonly encountered aspects of large-scale synthesis. Drawing extensively from literature case studies for illustration, Anderson also sprinkles useful tips throughout the text, while his use of lists, tables, and charts aids in reinforcing key concepts. The text readily succeeds as a highly practical tour throughout the considerations of chemical scale-up. Newly minted chemists will find this a valuable introductory text, while veteran researchers will also glean much from Anderson's extensive experience. The book can easily be recommended as a reading for a graduate organic synthesis course. Medicinal chemists may find this trove of practical synthetic know-how quite useful in their drug discovery programs. Certainly all readers will better appreciate the challenges faced by process chemists in bringing a compound through development and commercialization." --**Christopher R. Schmid, Senior Research Scientist, Lilly Research Laboratories, Eli Lilly and Company, JOURNAL OF MEDICINAL CHEMISTRY, 2001, Vol. 44, No.7** "In summary, we believe that every newcomer to the exciting field of process research and development should read this book, but also experienced process chemists and even academics will find it very useful and stimulating. As the language of stock analysts and brokers is very popular today, we recommend Practical Process Research and Development, by Neal G. Anderson, as a "strong buy" because this investment will pay off very quickly." --**ANGEWANDTE CHEMIE, 2001, 40, No. 7.** "...Filled with valuable insights and personal experience.... Dr. Anderson's book is indeed the best text on process development available to organic chemists. I have bought several for my group." --**ADVANCED SYNTHESIS AND CATALYSIS, 2001, Oljan Repic, Director of Process R&D, Novartis Institute for Biomedical Research**

### From the Back Cover

Bringing a compound to market quickly and profitably requires efficient and cost-effective processes for preparing large amounts of the target compound and intermediates. The key to rapid and successful process development is avoiding scale-up problems. However, an understanding of scale-up issues is rarely taught in academia and may take years of industrial experience to acquire.

**Practical Process Research & Development** teaches how to anticipate and avoid these problems when processes are being scaled up from the research lab or pilot plant. The approach is pragmatic, with a minimum of theory and over 100 practical scale-up tips. Many tables and detailed reaction schemes allow the reader to identify critical processing steps quickly. This practical guide is essential reading for chemists and chemical engineers involved in industrial process research and/or process development and for anyone seeking a clearer understanding of how and why process R&D is conducted in the pharmaceutical and fine chemicals industries.

## KEY FEATURES

- Provides insights into generating rugged, practical, cost-effective processes for the chemical preparation of "small molecules"
- Breaks down process optimization into route, reagent, and solvent selection, development of reaction conditions, workup, crystallizations, and more
- Describes how to anticipate and avoid difficulties in scaling up reactions
- Discusses guidelines for the timely development of processes
- Illuminates principles with examples from the recent literature
- Includes over 100 tips for rapid process development
- Presents guidelines for implementing and troubleshooting processes
- Written by an author with over 22 years experience in process R&D in the pharmaceutical industry

"... A must reference on every process chemists (both the novice and the experienced practitioner) desk. This will be required reading by all new chemists, engineers and analysts in my department."

--Sean T. Nugent, Searle Research & Development

## About the Author

Neal G. Anderson, Ph.D., has worked for over 20 years in chemical process R&D in the pharmaceutical industry. He earned a B.S. degree from the University of Illinois and a Ph.D. in medicinal chemistry from the University of Michigan and completed post-doctoral studies at McNeil Laboratories. With almost 18 years in process R&D at Bristol-Myers Squibb Co. in New Brunswick, New Jersey, Dr. Anderson has extensive hands-on experience in the laboratory, pilot plant, and manufacturing facilities. He has made key contributions to processes for the manufacture of four major drug substances, including captopril, and has participated in 12 manufacturing start-ups and successfully introduced many processes to pilot plants. He received the Bristol-Myers Squibb President's Award and spot awards, and his final position was Principal Scientist. In 1997, Dr. Anderson established Process Solutions L.L.C., a consulting firm offering practical guidance on developing and implementing processes for bulk pharmaceuticals and fine chemicals. As part of these consulting services, he presents courses on selected aspects of practical process R&D.

## Users Review

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