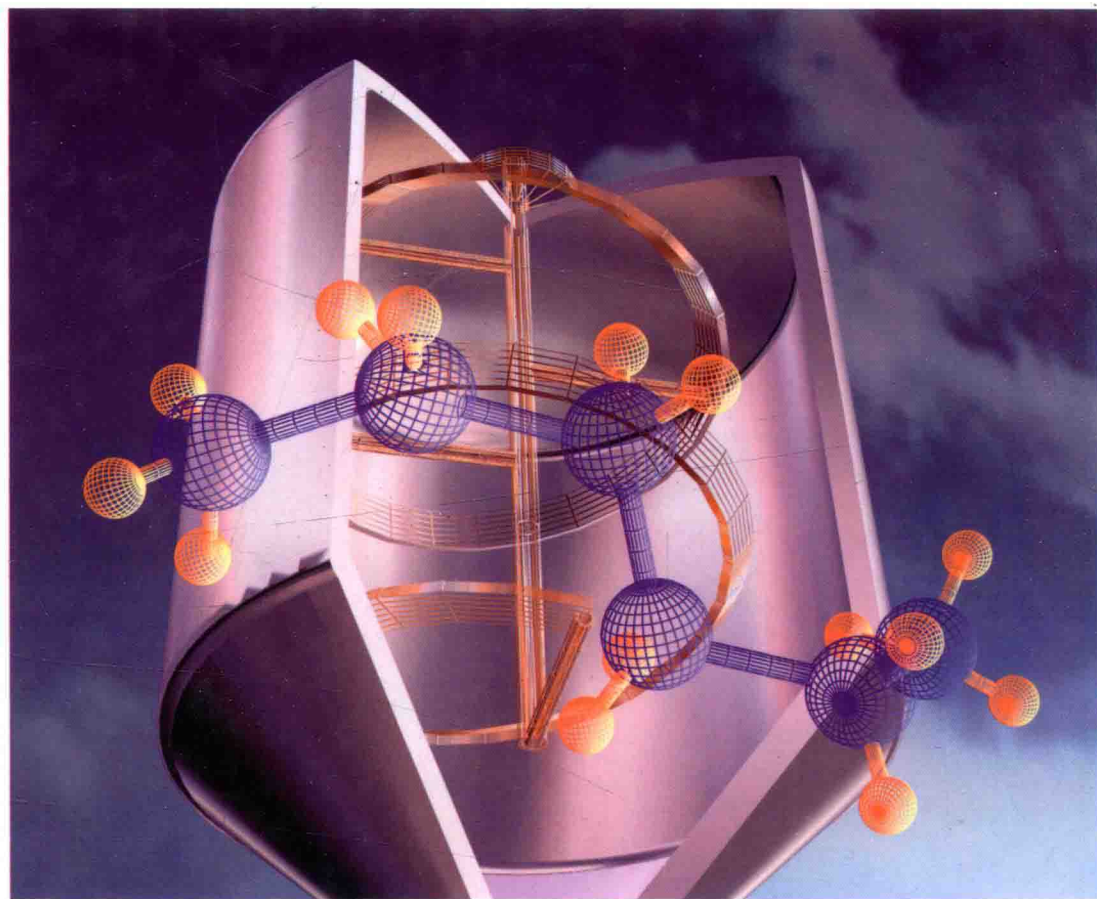


Edited by  
Thierry Meyer, Jos Keurentjes

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# Handbook of Polymer Reaction Engineering

Volume 2



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*Thierry Meyer, Jos Keurentjes*

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WILEY-  
VCH

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Volume 2

*Edited by*  
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## Foreword

A principal difference between science and engineering is intent. Science is used to bring understanding and order to a specific object of study – to build a body of knowledge with truth and observable laws. Engineering is more applied and practical, focused on using and exploiting scientific understanding and scientific principles to make products to benefit mankind. A polymer reaction engineer seeks the applied and practical as the title implies, but the path to success is most often through polymer science. This truth is steeped in history – there are many examples of polymeric products commercialized without adequate understanding of the chemistry and physics of the underlying polymerization. Polymer reaction engineers, faced with detriments in process safety, product quality or product cost, become the driving force behind many polymer science developments. As such, polymer reaction engineering is more a collaboration of polymer science and reaction engineering. A collaboration where polymer reaction engineers develop a firm understanding of the many aspects of polymer chemistry and physics to successfully apply chemical engineering principles to new product developments. Only through the integration of science and engineering are such products realized.

This handbook is a testimony to this melding of polymer science and chemical engineering that defines polymer reaction engineering. Thierry Meyer and Jos Keurentjes have compiled a strong list of contributors with an even balance from academia and industry. The text offers a comprehensive view of polymer reaction engineering. The text starts with an overview describing the important integration of science and engineering in polymer reaction engineering and ends with recent and potential breakthrough developments in polymer processing. The middle chapters are divided into three sections. The first section is devoted to the science and chemistry of the major types of polymerization. Included are step and chain growth polymerizations with chapters devoted specifically to several different chain growth methods. The central section of the middle chapters is dedicated to polymer reaction engineering tools and methods. The very important topics of safety and process control are detailed and help frame the conditions through which successful scale-ups are achieved. The last section of the middle chapters is focused on the physics and physical nature of formed polymers including their physical and mechanical structure. In these chapters, many of the processes that modify poly-

mers through man-made and natural change are discussed. The details of polymer end use are also presented.

This tome represents the first published handbook on polymer reaction engineering and should be well received in academia and industry. Polymer reaction engineering became recognized as a separate engineering discipline in the 1970's. It is well past due that such a handbook be published. The broad scope and depth of coverage should make it an important reference for years to come.

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## Preface

Freshly started as chairman and secretary of the Working Party on Polymer Reaction Engineering it never crossed our mind to edit a book on this subject. This changed when Wiley-VCH asked if the working party would be able to provide a translation of the *Handbuch der Technischen Polymerchemie*, written in 1993 by Adolf Echte. We decided to do so, but not exactly. Very rapidly we were convinced that we needed a completely new book, covering the field of polymer reaction engineering in a modern, broad and multidisciplinary approach. Many of the working party members directly agreed to participate, others needed somewhat stronger persuasion techniques, and for some chapters we hired authors from other institutions. In June 2003 we had completed the list of contributors, coming from Europe, Canada and the USA. Now, roughly one year later, the new handbook is there.

The quality an edited book like this very much depends on the quality of the individual contributions. It has been a great pleasure for us to see that all authors have taken their writing jobs very seriously. With these contributions, we are sure that this book represents the state of the art in polymer reaction engineering. It is intended to attract equally readers that are new in the field as well as readers that may be considered expert in some of the topics but want to broaden their knowledge. We are convinced that the multidisciplinary and synergetic approach presented in this book may act as an eye-opener for research and development activities going on in strongly related areas. We hope the reader will take advantage of this approach, where the references given in the various chapters may be a starting point for further reading.

Reading books, you often read the preface as well. We have seen numerous examples from which the frustration is quite obvious. Of course things may not always work out the way you plan, that has also been the case for this book. Maybe we were just lucky, but we have greatly enjoyed doing this. Editing this book has also been a starting point for the editors to become friends, including Swiss cheese fondue and Dutch "Friese nagelkaastaart" in a friendly home setting. From that perspective also Francine and Maartje have had their part both of the workload but also of the fun of all this.

Finally, we would like to thank Karin Sora and Renate Doetzer from Wiley-VCH



for their help with the editing process. They really know to find the balance between waiting and pushing in order not to diverge too far from the schedule.

Lausanne & Eindhoven, fall 2004  
Thierry Meyer & Jos Keurentjes

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