

Volume 19 Number 4 1994

ISSN 0079-6700

PROGRESS IN
**POLYMER
SCIENCE**

An International Review Journal

Editor: **O VOGL**
*Polytechnic University,
New York, USA*

Associate Editor: **G D JAYCOX**
*E. I. du Pont de Nemours & Co.,
Wilmington, USA*



PERGAMON



0079-6700(1994)19:4;1-0



THE SYNTHESIS OF POLYMERS BY TEMPLATE POLYMERIZATION

Y. YONG TAN

Laboratory of Polymer Chemistry, State University of Groningen, Nijenborgh 4,
 9747 AG Groningen, The Netherlands

CONTENTS

| | |
|---|-----|
| 1. Introduction | 561 |
| 2. General mechanistic considerations | 562 |
| 3. Interpolymer complexation as compared to template polymerization | 564 |
| 4. The location of the initiator | 566 |
| 5. Experimental methods in template polymerization | 566 |
| 6. Template polymerization by a radical mechanism | 567 |
| 6.1. Kinetics and mechanism | 567 |
| 6.2. Polyacids as templates | 570 |
| 6.3. Poly(<i>N</i> -vinylpyrrolidone) as template | 572 |
| 6.4. Polyethyleneglycol as template | 574 |
| 6.5. Other systems | 574 |
| 6.6. Polymerization of multivinyl/allyl monomers | 575 |
| 6.7. Copolymers as template | 576 |
| 6.8. Polymerization in the presence of two templates | 576 |
| 6.9. Crosslinked templates | 577 |
| 6.10. Template polymerization and the gel/occlusion effect | 577 |
| 7. Products of template polymerization | 578 |
| 7.1. Characterization | 578 |
| 7.2. Molar mass, molar mass distribution | 579 |
| 7.3. Microstructure, tacticity | 580 |
| 8. Template copolymerization | 580 |
| 8.1. Theory | 580 |
| 8.2. Practical examples | 581 |
| 9. Template polymerization by non-radical mechanisms | 582 |
| 10. Possible applications of template polymerization | 582 |
| 10.1. Imaging | 582 |
| 10.2. Conducting polymers | 583 |
| 10.3. Interpenetrating networks | 583 |
| 11. Concluding remarks | 584 |
| Acknowledgements | 584 |
| References | 584 |
| Glossary of Abbreviations | 586 |

1. INTRODUCTION

In template polymerization, propagation of a living polymer chain is understood to occur predominantly along a *macromolecular* chain – the template – through specific cooperative interactions.

The nature of interaction can be H-bonding, charge-transfer, or electrostatic. Non-specific Van der Waals interactions in combination with stereochemical matching