
CONTENTS

Contributors v

Preface vi

Chapter 1 Introduction to Polymers and Plastics

Carol M. F. Barry, Anne-Marie Baker, Joey L. Mead

1.1	Introduction	1.1
1.2	Polymer Structure and Synthesis	1.2
1.3	Solid Properties of Polymers	1.4
1.4	Mechanical Properties	1.6
1.5	Rheological Properties	1.12
1.6	Processing of Thermoplastics	1.16
1.7	References	1.43

Chapter 2 Thermoplastics

Anne-Marie Baker, Joey L. Mead

2.1	Introduction	2.1
2.2	Polymer Categories	2.1
2.3	Additives	2.56
2.4	Polymer Blends	2.58
2.5	References	2.58

Chapter 3 Thermosets

Rudolph D. Deanin

3.1	Materials and Applications	3.1
3.2	Processes	3.68
3.3	Conclusion	3.76
3.4	Bibliography	3.76

Chapter 4 Elastomers

Aubert Y. Coran

4.1	Introduction	4.1
4.2	Differences and Similarities between Elastomers and Plastics	4.3
4.3	Types of Elastomers	4.10
4.4	Properties of Elastomers	4.12
4.5	Vulcanizable Elastomers	4.22
4.6	Thermoplastic Elastomers	4.93
4.7	Additional Reading	4.111

Chapter 5 Plastics Additives

Rudolph D. Deanin

5.1	Stabilizers	5.2
5.2	Fillers and Reinforcements	5.17
5.3	Coupling Agents	5.28
5.4	Plasticizers	5.31
5.5	Lubricants and Processing Aids	5.35
5.6	Foaming Agents	5.40
5.7	Flame Retardants	5.42
5.8	Colorants	5.45
5.9	Antistats	5.50
5.10	Organic Peroxides	5.52

5.11	Polymer Blends	5.54
5.12	Miscellaneous Additives	5.59
5.13	General References	5.62
5.14	Specialized References	5.62

Chapter 6 Nanomanufacturing with Polymers

Daniel Schmidt, Joey Mead, Carol Barry

Julie Chen

6.1	Introduction	6.1
6.2	Nanocomposites	6.2
6.3	Nanofibers	6.11
6.4	Nanolayered Films	6.18
6.5	Molding of Nanoscale Features	6.21
6.6	Summary	6.24
6.7	References	6.24

Chapter 7 Plastics Joining

Edward M. Petrie

7.1	Introduction	7.1
7.2	General Plastic Material Considerations	7.2
7.3	Methods of Mechanical Joining	7.2
7.4	Adhesive Bonding	7.20
7.5	Welding	7.49
7.6	Recommended Assembly Processes for Common Plastics	7.57
7.7	References	7.66

Chapter 8 Plastics Recycling and Biodegradable Plastics

Susan E. Selke

8.1	Introduction	8.1
8.2	Recycling Collection	8.13
8.3	Recycling Processes	8.26
8.4	Polyethylene Terephthalate (PET) Recycling	8.37
8.5	High-Density Polyethylene (HDPE) Recycling	8.49
8.6	Recycling of Low-Density Polyethylene (LDPE) and Linear Low-Density Polyethylene (LLDPE)	8.56
8.7	Recycling of Polypropylene (PP)	8.58
8.8	Recycling of Polystyrene (PS)	8.59
8.9	Recycling of Polyvinyl Chloride (PVC)	8.63
8.10	Recycling of Nylon and Carpet	8.65
8.11	Recycling of Polyurethane	8.67
8.12	Recycling of Polycarbonate (PC)	8.69
8.13	Recycling of Acrylonitrile/Butadiene/Styrene Copolymers (ABS) and Other Plastics	8.69
8.14	Commingled Plastics and Plastic Lumber	8.70
8.15	Recycling Plastics from Electronics	8.72
8.16	Recycling Automotive Plastics	8.75
8.17	Design Issues	8.77
8.18	Legislation	8.81
8.19	Biodegradable Plastics	8.86
8.20	References	8.98

Chapter 9 Plastics and Elastomers: Automotive Applications

K. Sehanobish and Tom Traugott

9.1	Elastomeric Materials	9.1
9.2	Other Thermoplastics in Automotive Applications	9.6
9.3	References	9.28