

## CONTENTS

**Chapter 1. Instrumentation**

I. Introduction	3
II. Thermal Analysis Techniques	6
III. Thermogravimetry – The Thermobalance	9
IV. Commercial Thermobalances	34
V. Differential Thermal Analysis (DTA) and Differential Scanning Calorimetry (DSC)	46
VI. Commercial DTA and DSC Instruments	60
VII. Thermomechanical Analysis (TAM)	68
VIII. Evolved Gas Detection and Evolved Gas Analysis	74
IX. Miscellaneous Thermal Analysis Techniques	79
X. Conclusions	85
References	86

**Chapter 2. The Basis of Thermal Analysis**

I. Introduction	92
II. The Microscopic Structure of Materials	92
III. The Macroscopic Description of Materials	106
IV. Characterization of One-Component Systems	132
V. Characterization of Multicomponent Systems	185
VI. Conclusions	225
VII. Recommendations	227
References	228

**Chapter 3. Thermoplastic Polymers**

I. Introduction	237
II. Materials Classification and Relevant Chemical and Physical Parameters to the Thermal Behavior of Thermoplastic	238
III. Thermally Activated Processes and the Effect of Molecular and Morphological Parameters	245
IV. Thermal Behavior of Thermoplastics in Interactive and Degrading Environments	280
V. Typical Applications of Thermoanalytical Techniques	292
VI. Thermal and Complementary Techniques for Investigative Studies	311
VII. Special Topics	326
VIII. Conclusion	353
References	354

<b>Chapter 4. Block Copolymers and Polyblends</b>	
I. Introduction	365
II. Block and Graft Copolymers	366
III. Polyblends	408
IV. Conclusion	427
References	428
<b>Chapter 5. Thermosets</b>	
I. Introduction	435
II. Thermophysical Property Measurements	441
III. Effects of Catalysts, Fillers, Water, and Other Constituents	519
IV. Cur Kinetics from Dynamic Experiments	532
V. Specific Polymers: Chemistry and Trade Names	548
VI. Conclusions	559
References	563
<b>Chapter 6. Elastomers</b>	
I. Introduction	572
II. Nomenclature	577
III. Experimental Considerations	579
IV. Analysis of Single-Elastomer Systems	581
V. Analysis of Elastomer Blends	615
VI. Block Polymers	626
VII. Analysis of Cure Characteristics	636
VIII. Evaluation of Vulcanizate Composition by TG and DTG	649
IX. Application of Thermal Analyses to Commercial Elastomer Systems	682
X. Thermal Analysis of Elastomer Systems: Status and Outlook	702
References	704
<b>Chapter 7. Fibers</b>	
I. Introduction	709
II. Characterization of Fibers by TA	719
III. Specific Fibers	760
IV. Conclusions	783
References	785
<b>Chapter 8. Thermal Analysis in Polymer Flammability</b>	
I. Introduction	793
II. Polymer Flammability	794
III. Thermal Analysis and Flammability Evaluation	796
IV. Conclusions	839
References	841

**Chapter 9. Thermal Analysis of Additives on**

I. Introduction	845
II. Protective Agents	846
III. Plasticizers	878
IV. Other Additives	892
V. Conclusions	905
References	906
List of Symbols	911
Conversion Table	918
Author Index	922
Subject Index	949