

668.9 BAR Ref.

CONTENTS

Chapter 1 Introduction	1
1.1 Additives	2
1.2 Plastics formulations	5
1.3 Economic impact of polymer additives	9
1.4 Analysis of plastics	11
1.5 Bibliography	23
1.6 References	24
Chapter 2 Deformulation Principles	29
2.1 Polymer identification	30
2.2 Additive analysis of rubbers: "Best Practice"	32
2.3 Polymer extract analysis	42
2.4 In situ polymer/additive analysis	46
2.5 Class-specific polymer/additive analysis	47
2.6 Bibliography	48
2.7 References	48
Chapter 3 Sample Preparation Perspectives	51
3.1 Solvents	54
3.2 Extraction strategy	57
3.3 Conventional extraction technologies	59
3.4 High-pressure solvent extraction methods	81
3.5 Sorbent extraction	123
3.6 Methodological comparison of extraction methods	134
3.7 Polymer/additive dissolution methods	146
3.8 Hydrolysis	152
3.9 Bibliography	155
3.10 References	156
Chapter 4 Separation Techniques	171
4.1 Analytical detectors	177
4.2 Gas chromatography	181
4.3 Supercritical fluid chromatography	205
4.4 Liquid chromatography techniques	273
4.5 Capillary electrophoretic techniques	273
4.6 Bibliography	278
4.7 References	281
Chapter 5 Polymer/Additive Analysis: The Spectroscopic Alternative	299
5.1 Ultraviolet/visible spectrophotometry	302
5.2 Infrared spectroscopy	3111
5.3 Luminescence spectroscopy	318
5.4 High-resolution nuclear magnetic resonance spectroscopy	323
5.5 Bibliography	342
5.6 References	342
Chapter 6 Organic Mass-Spectrometric Methods	349
6.1 Basic instrumentation	351
6.2 Ion sources	357
6.3 Mass analysers	386
6.4 Direct mass-spectrometric polymer compound analysis	407
6.5 Ion mobility spectrometry	415
6.6 Bibliography	417
6.7 References	418

Chapter 7 Multihyphenation and Multidimensionality in Polymer/Additive Analysis	425
7.1 Precolumn hyphenation	428
7.2 Coupled sample preparation-spectroscopy/spectrometry	449
7.3 Postcolumn hyphenation	452
7.4 Multidimensional chromatography	545
7.5 Multidimensional spectroscopy	560
7.6 Bibliography	562
7.7 References	564
Chapter 8 Inorganic and Element Analytical Methods	585
8.1 Element analytical protocols	587
8.2 Sample destruction for classical elemental analysis	591
8.3 Analytical atomic spectrometry	605
8.4 X-ray spectrometry	627
8.5 Inorganic mass spectrometry	648
8.6 Radioanalytical and nuclear analytical methods	662
8.7 Electroanalytical techniques	666
8.8 Solid-state speciation analysis	674
8.9 Bibliography	677
8.10 References	679
Chapter 9 Direct Methods of Deformulation of Polymer/Additive Dissolutions	691
9.1 Chromatographic methods	692
9.2 Spectroscopic techniques	696
9.3 Mass-spectrometric methods	701
9.4 References	709
Chapter 10 A Vision for the Future	711
10.1 Trends in polymer technology	712
10.2 Trends in additive technology	715
10.3 Environmental, legislative and regulatory constraints	723
10.4 Analytical consequences	725
10.5 Epilogue	746
10.6 Bibliography	747
10.7 References	747
Appendix I	751
Appendix II	773
Appendix III	793
Index	803

