543.086 HAI

CONTENTS

1.	Introduction to thermal methods	1
	1.1 Introduction	1
	1.2 Historical development	3
	1.3 Definitions	3
	1.4 Computers and thermal methods	11
	1.5 Factors affecting thermal analysis results	13
	1.6 Simultaneous and complementary techniques	18
	1.7 Problems	19
2.	Thermogravimetry	22
	2.1 Introduction	22
	2.2 Historical	22
	2.3 Definition of thermogravimetry	23
	2.4 Apparatus	23
	2.5 Kinetics of reactions	31
	2.6 Applications of thermogravimetry	42
	2.7 Controlled rate thermogravimetry and Hi-Res TM TGA	56
	2.8 Problems	59
3.	Differential thermal analysis and differential scanning calorimetry	63
	3.1 Introduction	63
	3.2 Historical	63
	3.3 Definitions	64
	3.4 Apparatus	66
	3.5 Theory of DTA and DSC	69
	3.6 Heat flux DSC	74
	3.7 Power-compensated DSC	76
	3.8 Calibration	77
	3.9 Applications	78
	3.10 Specialist DSC systems	114
	3.11 Problems	118

4.	Thermomechanical, dynamic mechanical and associated methods	123
	4.1 Introduction	123
	4.2 Definitions	123
	4.3 Thermomechanical analysis	128
	4.4 Dynamic mechanical analysis	139
	4.5 Dielectric thermal analysis	151
	4.6 Thermally stimulated current analysis and relaxation map analysis	154
	4.7 Problems	156
5.	Simultaneous techniques and product analysis	161
	5.1 Introduction	161
	5.2 Simultaneous thermal analysis	162
	5.3 Evolved gas analysis	167
	5.4 Detection and identification of evolved gases	169
	5.5 Infrared and simultaneous TA-infrared	176
	5.6 Infrared product analysis	184
	5.7 Thermomicroscopy	186
	5.8 X-ray methods	192
	5.9 Electron microscopy and associated techniques	198
	5.10 Conclusion	200
	5.11 Less common thermal analysis techniques	200
	5.12 Problems	201
6.	Problem solving and applications of thermal methods	206