

1.5.6 Calibration and Standardization	26
1.5.7 Applications	26
1.5.8 Summary	26
1.6 References	102
1.7 Acknowledgements	103
1.8 References	103

Contents

1 TMG History	1
<i>Edward L. Charsley, Peter J. Haines and Fred W. Wilburn</i>	
1.1 Introduction	1
1.2 The Early Years	1
1.3 TMG Committee Structure	2
1.4 TMG Meetings	4
1.5 Thermal Analysis Schools/Short Courses	6
1.6 TMG News and Website	7
1.7 TMG Cyril Keattch Award	7
1.8 Thermal Analysis and Calorimetry Equipment Manufacturers	9
1.9 International Confederation for Thermal Analysis and Calorimetry	10
1.10 The European Symposium on Thermal Analysis and Calorimetry	11
1.11 High Alumina Cement Crisis	12
1.12 The Future	12
Acknowledgements	13
References	13

Principles of Thermal Analysis and Calorimetry: 2nd Edition

Edited by Simon Gaisford, Vicky Kett and Peter Haines

© The Royal Society of Chemistry 2016

Published by the Royal Society of Chemistry, www.rsc.org

2 Thermal Analysis Nomenclature	14
<i>Trevor Lever</i>	
2.1 Introduction	14
References	17
3 Thermogravimetry	18
<i>Vicky L. Kett and Duncan M. Price</i>	
3.1 Introduction	18
3.2 Instrumentation	19
3.3 Basic Experiments	25
3.4 Advanced Temperature Programmes	33
3.5 Simultaneous and Hyphenated Methods	38
3.6 Summary	42
References	43
4 Dynamic Vapour Sorption	47
<i>Nicole Hunter</i>	
4.1 Introduction and Principles	47
4.2 Definitions and Nomenclature	48
4.3 Principles of the Technique	49
4.4 Instrumentation Design	54
4.5 Experimental Considerations/Best Practice	58
4.6 Calibration	62
4.7 Applications	63
4.8 Summary	65
Further Reading	65
References	66
5 Differential Scanning Calorimetry	67
<i>Paul Gabbott and Tim Mann</i>	
5.1 Introduction and Principles	67
5.2 Definition and Nomenclature	68
5.3 Principles of the Technique	73
5.4 Instrument Design	76
5.5 Experimental Considerations/Best Practice	79

5.6	Calibration and Verification	92
5.7	Applications	94
5.8	Summary	102
	References	103

6 Modulated Temperature Differential Scanning Calorimetry 104

Vicky Kett

6.1	Introduction and Principles	104
6.2	Definition and Nomenclature	104
6.3	Principles of the Technique	105
6.4	Instrumentation Design	111
6.5	Experimental Considerations/Best Practice	112
6.6	Calibration	115
6.7	Applications	116
6.8	Summary	121
6.9	Further Reading	121
	References	121

7 Isothermal Microcalorimetry 123

Simon Gaisford

7.1	Introduction and Principles	123
7.2	Definitions and Nomenclature	124
7.3	Principles of the Technique	127
7.4	Instrumentation Design	132
7.5	Experimental Considerations/Best Practice	136
7.6	Calibration	140
7.7	Applications	142
7.8	Summary	143
	References	144

8 Isothermal Reaction Calorimetry and Adiabatic Calorimetry 146

Ian Priestley

8.1	Introduction and Principles	146
-----	-----------------------------	-----

8.2	Isothermal Reaction Calorimetry	147
8.3	Adiabatic Calorimetry	154
8.4	Applications	161
8.5	Summary	162
	References	162

9 Thermomechanical, Dynamic Mechanical and Dielectric Methods 164

John C. Duncan and Duncan M. Price

9.1	Introduction and Principles	164
9.2	Instrumentation	173
9.3	Typical Experiments	178
9.4	Applications	192
9.5	Sample Controlled and Modulated Temperature Techniques	201
9.6	Localised Thermomechanical and Dynamic Mechanical Measurements	204
9.7	Summary	209
	Further Reading	210
	Acknowledgements	211
	References	211

10 Simultaneous Thermal Techniques 214

Ian J. Scowen and Richard Telford

10.1	Introduction and Principles	214
10.2	Simultaneous Thermal Analysis	215
10.3	Evolved Gas Detection and Evolved Gas Analysis	216
10.4	<i>In Situ</i> Spectroscopic Analysis	223
10.5	Summary	226
	References	228

11 Sample Controlled Thermal Analysis 232

G. M. B. Parkes and E. L. Charsley

11.1	Introduction	232
------	--------------	-----

11.2	SCTA Control Techniques	233
11.3	SCTA and the Study of Reaction Mechanisms and Kinetics	238
11.4	SCTA Instrumentation and Applications	240
11.5	Summary	255
	Further Reading	255
	References	256

Subject Index 259

*1906, School of Applied Sciences, University of Huddersfield, Queensgate, Huddersfield HD1 3 DH, UK; †Oakland Analytical Services, 35 Goldland Avenue, Farnham, Surrey GU9 9DX, UK; ‡Southport, UK
*Email: e.l.charsley@hud.ac.uk

1.1 Introduction

In 2015, the Thermal Methods Group (TMG), an interest group of the Royal Society of Chemistry (RSC), entered its 50th year. It seems appropriate therefore to not only look back to its origins but also to review briefly its activities since its formation and its current role in the field of thermal analysis and calorimetry. For readers interested in a more detailed account of the formation of the Group, there is an excellent paper covering the first twenty-one years of the TMG's history.¹

1.2 The Early Years

The 1960s were an exciting time for thermal analysis. The field was growing rapidly and the range of commercially available equipment was expanding, including the introduction of both power-compensated and heat flux differential scanning calorimeters. In addition, a significant number of thermal analysts were engaged in building their own equipment, particularly in the field of simultaneous thermogravimetry-differential thermal analysis.