THEORETICAL INVESTIGATION OF THERMOGRAVIMETRIC ANALYSIS ON THE DECOMPOSITION OF SOLID-STATE MATERIALS

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DECLARATION

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ABSTRACT

Thermogravimetric (TG) analysis and differential thermogravimetric (DTG) analysis are the most commonly used analytical techniques to determine the kinetic behaviour of solid-state chemical reactions through Arrhenius parameters and reaction model, which is called the kinetic triplet of solid-state reactions. There are number of methods proposed in the literature for extracting the kinetic parameters of solid-state reactions from TG & DTG thermograms. However, thermal event separation using curve fitting where overlapped thermal events may be present is mandatory before further TG/DTG analysis. In this study, a better curve fitting procedure and a new model fitting method for kinetic parameter extraction is proposed. Enhanced accuracy of the proposed method is proved by MATLAB® based, simulated DTG signals. Furthermore, a mathematical approach using higher differentials of DTG signal was developed to count the number of thermal events in overlapped DTG peaks.

CONTENTS

Declaration ii

Acknowledgement iii

Abstract v

Contents vi

List of tables x

List of figures xi

List of abbreviations xvi

1. Introduction 1

1.1. Thermal Analysis 1

1.1.1. TG/DSC machine and technique 1

1.1.2. TGA instrumentation 2

1.2. Reaction kinetics 6

1.2.1. Solid state reactions 9

1.3. Determination of kinetic parameters 13

1.3.1. Model fitting method 13

1.3.2. Invariant kinetic parameter methods 14

1.3.3. Model free method 15

1.3.4. Determination of reaction model function 16

1.4. Requirement of a new methodology 17

1.5. Objectives of the study 18

1.6. Outline of dissertation 19

2. Methodology 21

2.1. DTG Signal generation 23

2.2. Peak height and peak position analysis 25
2.3. FWHM analysis 30
2.4. Asymmetric parameter variation 33
2.5. Curve fitting 36
2.6. Kinetic Parameter extraction and analyses 39
3. Characteristic Properties of DTG Signal 42
3.1. DTG Peak Height 42
3.1.1. DTG Peak Height Variation 43
3.2. Full Width at Half Max 49
3.2.1. FWHM Variation 49
3.3. DTG Peak Position 53
3.4. Peak Asymmetry 59
3.4.1. Previous asymmetric parameters 59
3.4.2. New asymmetric parameter J 59
3.4.3. Variation of the peak asymmetry parameter- J 60
3.4.4. Effect of resolution on variation of peak asymmetry 62
4. Function Selection for Curve Fitting 66
4.1. Symmetric functions 66
4.1.1. Gaussian function 66
4.1.2. Lorentz function 67
4.2. Asymmetric functions 68
4.2.1. Lognormal function 68
4.2.2. Asymmetric Double Sigmoidal function 69
4.3. COD Variation 71
4.3.1. 1st order reactions 72
4.3.2. 2nd order reactions 73

4.3.3. A2 reactions 74
4.3.4. D1 reactions 75
4.3.5. P2 reactions 76
4.3.6. R2 reactions 77
4.4. Best fitting function 78
5. Determination of Kinetic Parameters 80
5.1. Linearized curves for data extracted from fitting 81
5.2. The 90% Rule 83
5.3. Errors in extracted kinetic parameters 84
5.4. Error variation in activation energy by 90% rule 84
5.4.1. E error % variation by 90% rule–1st order reactions 85
5.4.2. E error % variation by 90% rule–2nd order reactions 86
5.4.3. E error % variation by 90% rule–A2 reactions 87
5.4.4. E error % variation by 90% rule–D1 reactions 88
5.4.5. E error % variation by 90% rule–P2 reactions 89
5.4.6. E error % variation by 90% rule–R2 reactions 90
5.5. Determining the best trimming percentage 91
5.5.1. E error bars for height %– Gaussian fit 93
5.5.2. E error bars for height % – Lorentz fit 95
5.5.3. E error bars for height % – Lognormal fit 97
5.5.4. E error bars for height % – ADS fit 99
6. Identification of Overlapped Peaks 104
6.1. Introduction 104
6.1.1. Resolution - R_s 104
6.1.2. Peak identification using derivatives 105
6.1.3. Critical resolution and shoulder limit 106

6.1.4. Statistical theory of peak overlap 107
6.2. Resolution of DTG signal 109
6.2.1. Resolution variation 109
6.2.2. Critical resolution of DTG signal 113
6.2.3. Relative height on peak resolution 115
7. Conclusions 116
Reference 118

LIST OF TABLES

Table 1.1: Reaction model functions 12
Table 3.1: Peak height multiplication factors for different mechanisms 48
Table 3.2:FWHM multiplication factors for different mechanisms 52
Table 3.3: Multiplication factors for different mechanisms 57
Table 3.4: Peak position deviation from 1st order reactions..... 57
Table 3.5: Maximum and minimum J range 62
Table 4.1: COD ranges for fit functions..... 78
Table 5.1: Activation energy error% range..... 91
Table 6.1:critical resolutions values for different fixed peaks..... 114

LIST OF FIGURES

Figure 1.1: Schematic diagram of Modern TGA machine 2
Figure 1.2: schematic diagram of TGA balance 3
Figure 1.3:non-isothermal TGA signal of type T1-1 PVC cable insulation 5
Figure 1.4: isothermal TGA signal of type TI-1 PVC cable insulation at constant temperature 5
Figure 1.5: types of rate variations 10
Figure 1.6:DTG signal analysis methods 13
Figure 1.7: Flow chart of improved shape method 17
Figure 2.1:Methodology 21
Figure 2.2: Flow Chart-Signal generation 24
Figure 2.3:Flow Chart- Peak height analysis 27
Figure 2.4:Flow Chart-Peak position analysis 29
Figure 2.5:Flow Chart-FWHM analysis 32
Figure 2.6:Flow Chart-J analysis 35
Figure 2.7:Flow Chart-Curve fitting 38
Figure 2.8:Flow Chart-Arrhenius differential method 40
Figure 2.9:Flow Chart-development of new methodology 41
Figure 3.1:graphical representation of peak height 43
Figure 3.2: DTG Peak height variation-1st order reactions 45
Figure 3.3:DTG Peak height variation-2nd order reactions 45
Figure 3.4:DTG Peak height variation-A2 reactions 45
Figure 3.5:DTG Peak height variation-D1 reactions 46
Figure 3.6:DTG Peak height variation-P2 reactions 46
Figure 3.7:DTG Peak height variation-R2 reactions 46
Figure 3.8:peak height variation of other mechanisms with 1st order reactions 48
Figure 3.9:graphical representation of FWHM 49
Figure 3.10: FWHM variation - 1st order reactions 50
Figure 3.11:FWHM variation - 2nd order reactions 50
Figure 3.12:FWHM variation - A2 reactions 50
Figure 3.13:FWHM variation - D1 reactions 51

Figure 3.14:FWHM variation - P2 reactions 51
Figure 3.15:FWHM variation - R2 reactions 51
Figure 3.16:FWHM variation of other mechanisms with 1st order reactions..... 52
Figure 3.17:Peak position - 1st order reactions..... 54
Figure 3.18:Peak position - 2nd order reactions 54
Figure 3.19:Peak position - A2 reactions..... 54
Figure 3.20:Peak position - D1 reactions..... 55
Figure 3.21:Peak position - P2 reactions 55
Figure 3.22:Peak position - R2 reactions..... 55
Figure 3.23:Peak position variation of other mechanisms with 1st order reactions .. 56
Figure 3.24:Surface fit for peak position variation-1st order reactions 58
Figure 3.25:Graphical representation of asymmetric parameter (J)..... 60
Figure 3.26: J variation - 1st order reactions 61
Figure 3.27: J variation - 2nd order reactions 61
Figure 3.28:Graphical representation of different peak positions..... 62
Figure 3.29: J variation- 1st order reactions, Full range. 64
Figure 3.30:J variation-1st order reactions, For 105<A<2*105 & 100kJ<E<110kJ . 64
Figure 3.31:J variation-1st order reactions, For 105<A<2*105 & 100kJ<E<110kJ . 65
Figure 3.32:J variation- 1st order reactions, Full range 65
Figure 4.1:Gaussian curve..... 66
Figure 4.2: Gaussian fit-1st order reaction..... 67
Figure 4.3:Lorentzian curve 67
Figure 4.4:Lorentz fit-1st order reaction..... 68
Figure 4.5:Lognormal curve 68
Figure 4.6:Lognormal fit-1st order reaction..... 69
Figure 4.7:ADS curve 69
Figure 4.8:Asymmetric Double Sigmoidal fit-1st order reaction 70
Figure 4.9:COD variation- 1st order-Gaussian fit…… 72
Figure 4.10:COD variation- 1st order-Lorentz fit....……...72
Figure 4.11:COD variation- 1st order-Lognormal fit 72
Figure 4.12:COD variation- 1st order-ADS fit……..72
Figure 4.13:COD variation- 2nd order-Gaussian fit 73

Figure 4.14:COD variation- 2nd order-Lorentz fit…….. 73
Figure 4.15:COD variation- 2nd order-Lognormal fit……73
Figure 4.16:COD variation- 2nd order-ADS fit…….. 73
Figure 4.17:COD variation- A2-Gaussian fit…… 74
Figure 4.18:COD variation- A2-Lorentz fit……74
Figure 4.19:COD variation- A2-Lognormal fit…… ..74
Figure 4.20:COD variation- A2-ADS fit……..…… 74
Figure 4.21:COD variation- D1-Gaussian fit……..……75
Figure 4.22:COD variation- D1-Lorentz fit…… 75
Figure 4.23:COD variation- D1-Lognormal fit…..... 75
Figure 4.24:COD variation- D1-ADS fit…….. 75
Figure 4.25:COD variation- P2-Gaussian fit…..... 76
Figure 4.26:COD variation- P2-Lorentz fit…..... 76
Figure 4.27:COD variation- P2-Lognormal fit… 76
Figure 4.28:COD variation- P2-ADS fit…….. 76
Figure 4.29:COD variation- R2-Gaussian fit…. 77
Figure 4.30:COD variation- R2-Lorentz fit…… 77
Figure 4.31:COD variation- R2-Lognormal fit…..... 77
Figure 4.32:COD variation- R2-ADS fit……..... 77
Figure 5.1:Arrhenius differential method for single peak data 80
Figure 5.2: Arrhenius differential method for fitted data..... 81
Figure 5.3:fiting errors near the tail 82
Figure 5.4:Graphical representation of the 90% rule 83
Figure 5.5:Linear regression only for 90% 84
Figure 5.6:E error % variation by 90% rule–1st order reactions-Gaussian fit…. 85
Figure 5.7:E error % variation by 90% rule–1st order reactions-Lorentz fit…… 85
Figure 5.8:E error % variation by 90% rule–1st order reactions-Lognormal fit…..… 85
Figure 5.9:E error % variation by 90% rule–1st order reactions-ADS fit…… . 85
Figure 5.10:E error % variation by 90% rule–2nd order reactions-Gaussian fit…….86
Figure 5.11:E error % variation by 90% rule–2nd order reactions-Lorentz fit……. 86

Figure 5.12:E error % variation by 90% rule–2nd order reactions-Lognormal fit.....86
Figure 5.13:E error % variation by 90% rule–2nd order reactions-ADS fit……86
Figure 5.14:E error % variation by 90% rule–A2 reactions-Gaussian fit…… 87
Figure 5.15:E error % variation by 90% rule–A2 reactions-Lorentz fit…… 87
Figure 5.16:E error % variation by 90% rule–A2 reactions-Lognormal fit…..... 87
Figure 5.17:E error % variation by 90% rule–A2 reactions-ADS fit……..... 87
Figure 5.18:E error % variation by 90% rule–D1 reactions-Gaussian fit…… 88
Figure 5.19:E error % variation by 90% rule–D1 reactions-Lorentz fit……. 88
Figure 5.20:E error % variation by 90% rule–D1 reactions-Lognormal fit…..... 88
Figure 5.21:E error % variation by 90% rule–D1 reactions-ADS fit……..... 88
Figure 5.22:E error % variation by 90% rule–P2 reactions-Gaussian fit…… 89
Figure 5.23:E error % variation by 90% rule–P2 reactions-Lorentz fit……..... 89
Figure 5.24:E error % variation by 90% rule–P2 reactions-Lognormal fit…..... 89
Figure 5.25:E error % variation by 90% rule–P2 reactions-ADS fit…… 89
Figure 5.26:E error % variation by 90% rule–R2 reactions-Gaussian fit…… 90
Figure 5.27:E error % variation by 90% rule–R2 reactions-Lorentz fit……. 90
Figure 5.28E error % variation by 90% rule–R2 reactions-Lognormal fit…. 90
Figure 5.29:E error % variation by 90% rule–R2 reactions-ADS fit……..... 90
Figure 5.30:E error bars for height %– Gaussian fit -1st order reactions 93
Figure 5.31:E error bars for height %– Gaussian fit -2nd order reactions..... 93
Figure 5.32:E error bars for height %– Gaussian fit -A2 reactions 93
Figure 5.33:E error bars for height %– Gaussian fit -D1 reactions 94
Figure 5.34:E error bars for height %– Gaussian fit -P2 reactions 94
Figure 5.35:E error bars for height %– Gaussian fit -R2 reactions..... 94
Figure 5.36: E error bars for height % – Lorentz fit-1st order reactions 95
Figure 5.37:E error bars for height % – Lorentz fit-2nd order reactions 95
Figure 5.38:E error bars for height % – Lorentz fit-A2 reactions..... 95
Figure 5.39:E error bars for height % – Lorentz fit-D1 reactions..... 96
Figure 5.40:E error bars for height % – Lorentz fit-P2 reactions 96
Figure 5.41:E error bars for height % – Lorentz fit-R2 reactions..... 96
Figure 5.42:E error bars for height % – Lognormal fit-1st order reactions 97

Figure 5.43:E error bars for height % – Lognormal fit-2nd order reactions..... 97
Figure 5.44:E error bars for height % – Lognormal fit-A2 reactions 97
Figure 5.45:E error bars for height % – Lognormal fit-D1 reactions 98
Figure 5.46:E error bars for height % – Lognormal fit-P2 reactions..... 98
Figure 5.47:E error bars for height % – Lognormal fit-R2 reactions..... 98
Figure 5.48:E error bars for height % – ADS fit-1st order reactions..... 99
Figure 5.49:E error bars for height % – ADS fit-2nd order reactions..... 99
Figure 5.50:E error bars for height % – ADS fit-A2 reactions 99
Figure 5.51:E error bars for height % – ADS fit-D1 reactions 100
Figure 5.52:E error bars for height % – ADS fit-P2 reactions..... 100
Figure 5.53:E error bars for height % – ADS fit-R2 reactions 100
Figure 5.54:10% range of the error bands..... 102
Figure 6.1:overlapped DTG signal..... 104
Figure 6.2: derivatives of TG/DTG signal 105
Figure 6.3:Critical resolution at shoulder limit..... 106
Figure 6.4:Critical resolution variation with relative peak height 109
Figure 6.5:Graphical representation of Peak shift..... 110
Figure 6.6:Resolution variation contours 1st order – 1st order reactions 111
Figure 6.7:Resolution variation contours 2nd order – 2nd order reactions..... 111
Figure 6.8:Resolution variation contours A2-A2 reactions 111
Figure 6.9:Resolution variation contours D1-D1 reactions 112
Figure 6.10:Resolution variation contours P2-P2 reactions..... 112
Figure 6.11:Resolution variation contours R2-R2 reactions..... 112
Figure 6.12: shoulder limit variation..... 113
Figure 6.13:Critical resolution vs relative height..... 115

LIST OF ABBREVIATIONS

TGA	Thermo Gravimetric Analysis
DTG	Differential Thermo Gravimetry
DSC	Differential scanning calorimetry
COD	Coefficient of Determination
ADS	Asymmetric Double Sigmoidal
FWHM	Full Width at Half Maximum
IKP	Invariant Kinetic Parameter
EGA	Evolved Gas Analysis