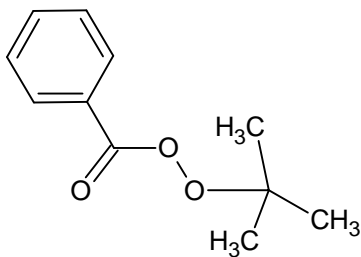


tert-Butyl perbenzoate

$C_{11}H_{14}O_3$

TBPBZ

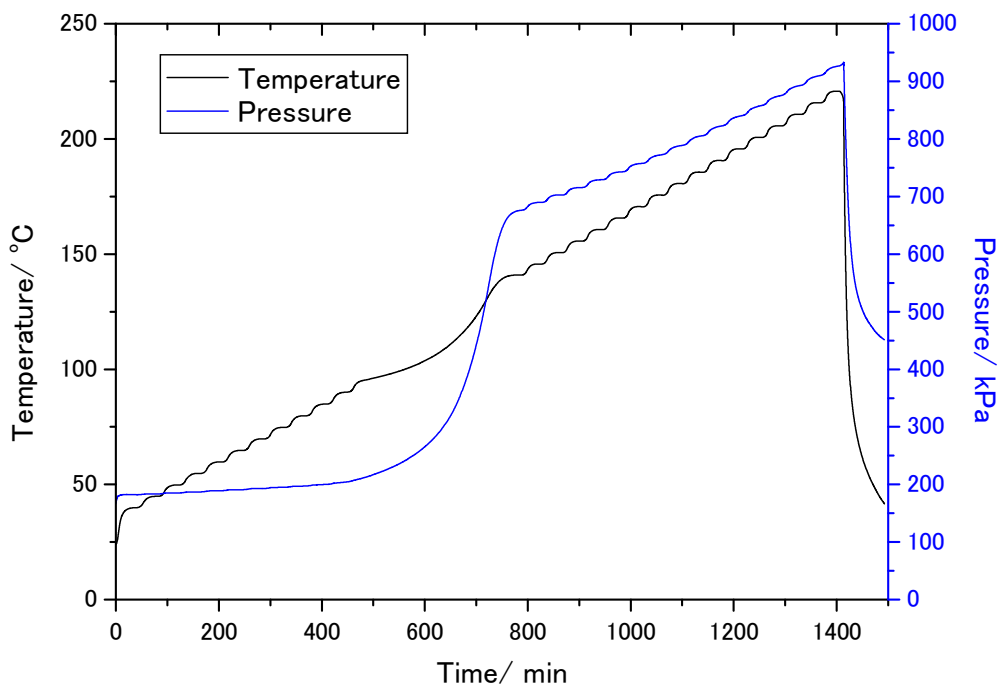


ARC device: New ARC (TIAX, LLC)

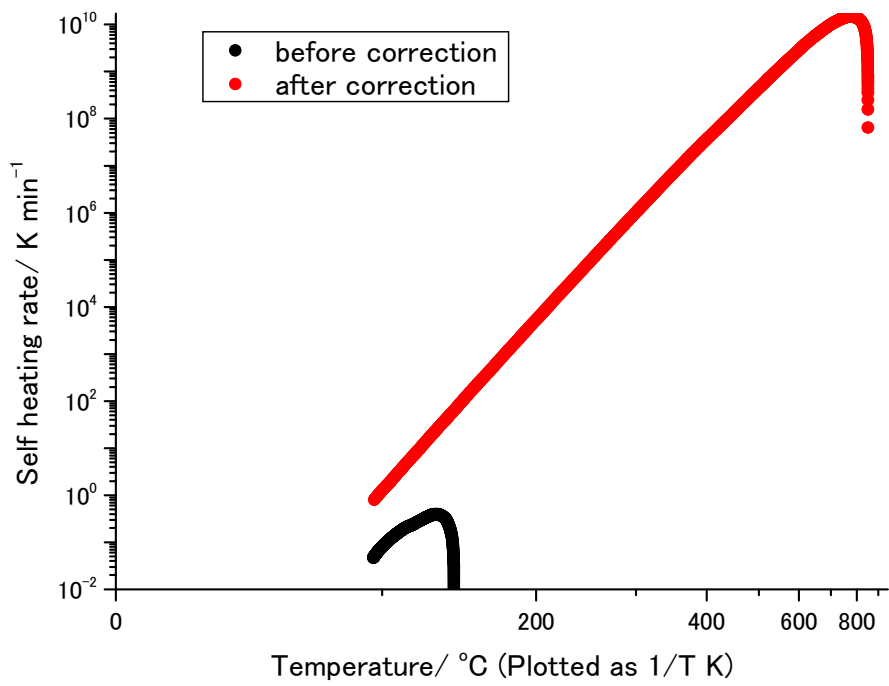
Date: 2009/2, 2009/7

Operator: Y. S.

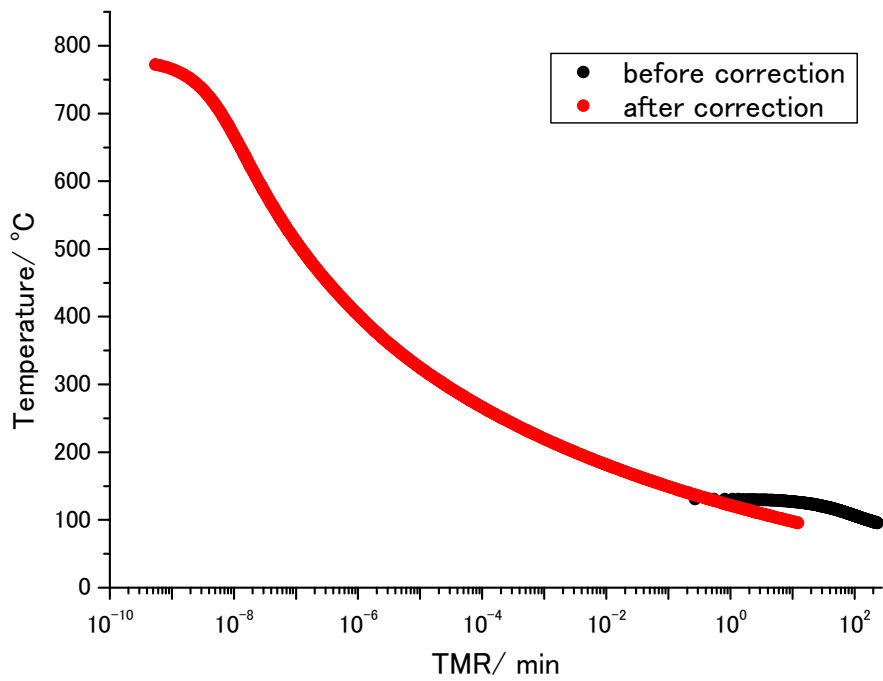
a) Weight: 0.263 g



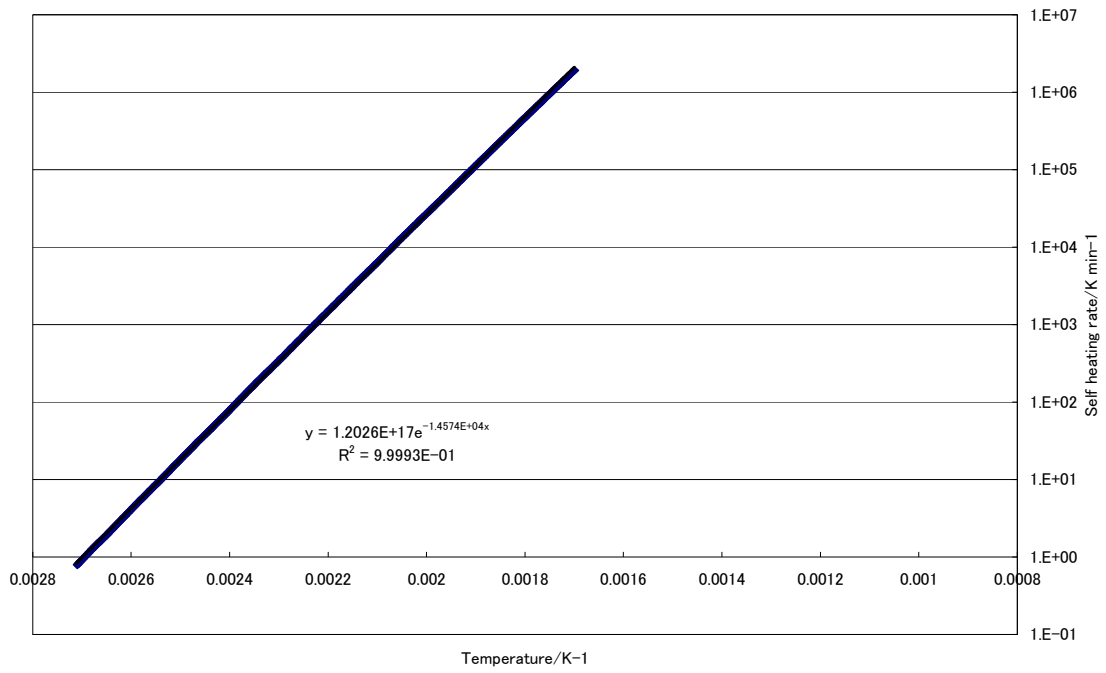
Time vs. Temperature and Pressure



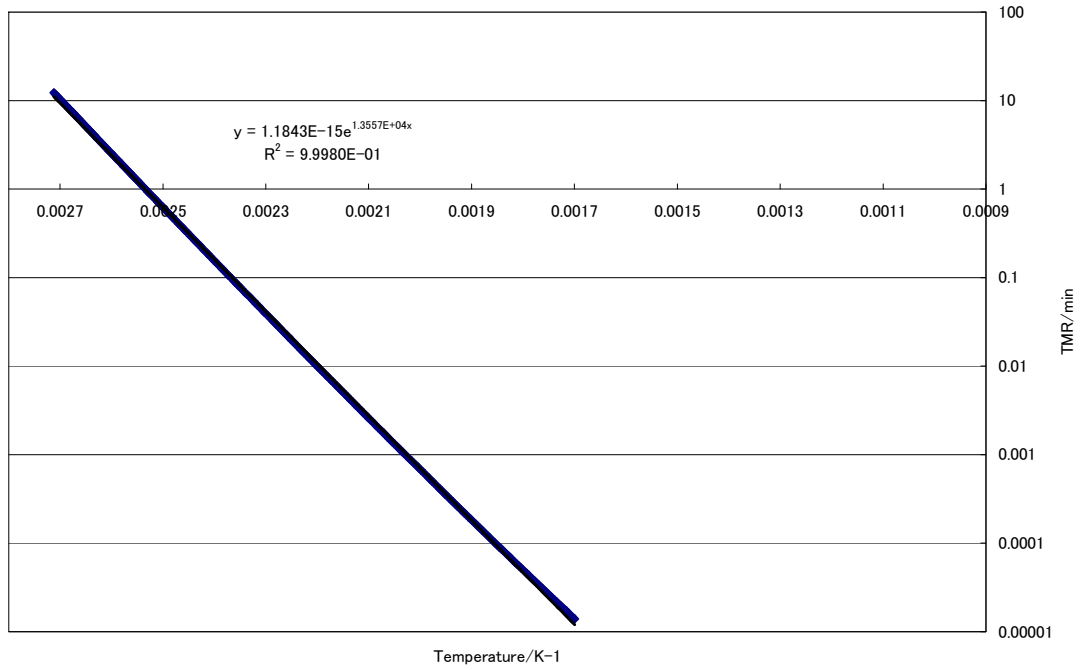
Temperature vs. Self heating rate



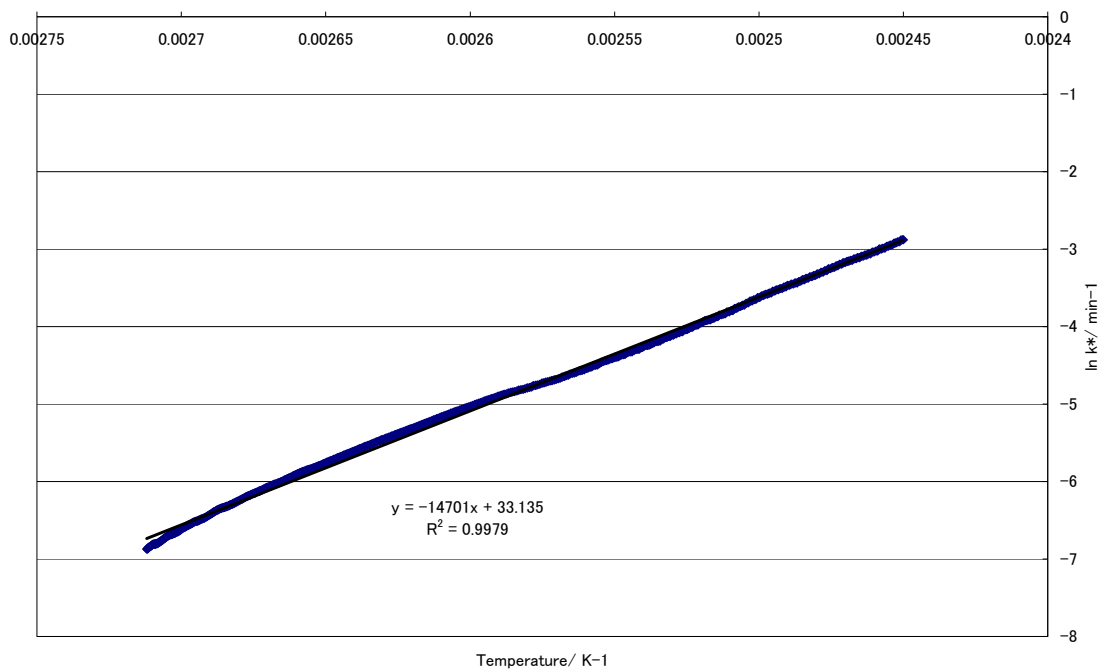
TMR vs. Temperature



Temperature vs. Self heating rate (approximate calculation)

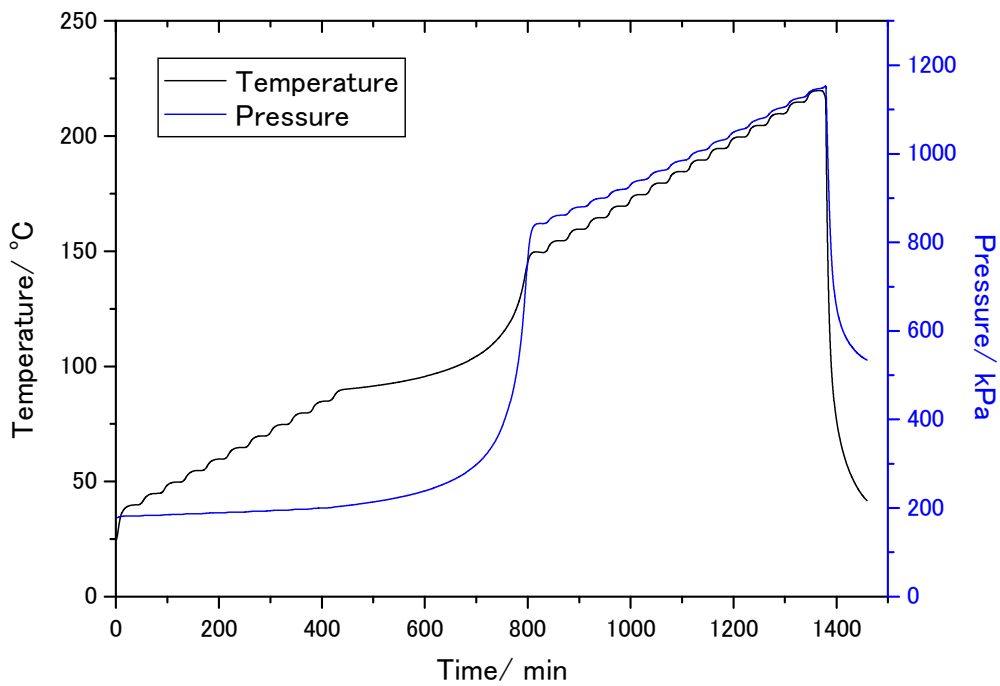


Temperature vs. TMR (approximate calculation)

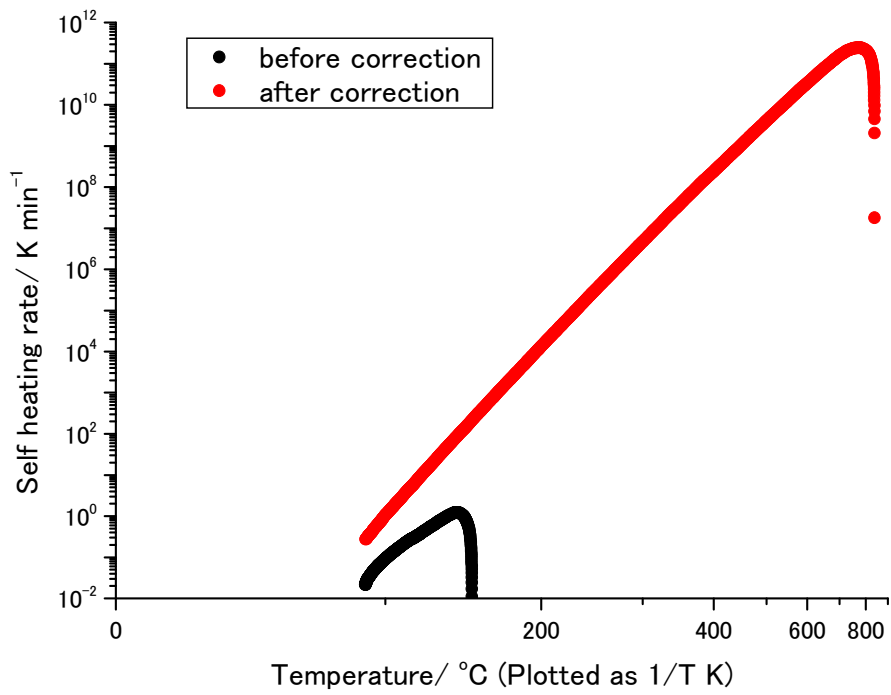


Arrhenius equation (approximate calculation)

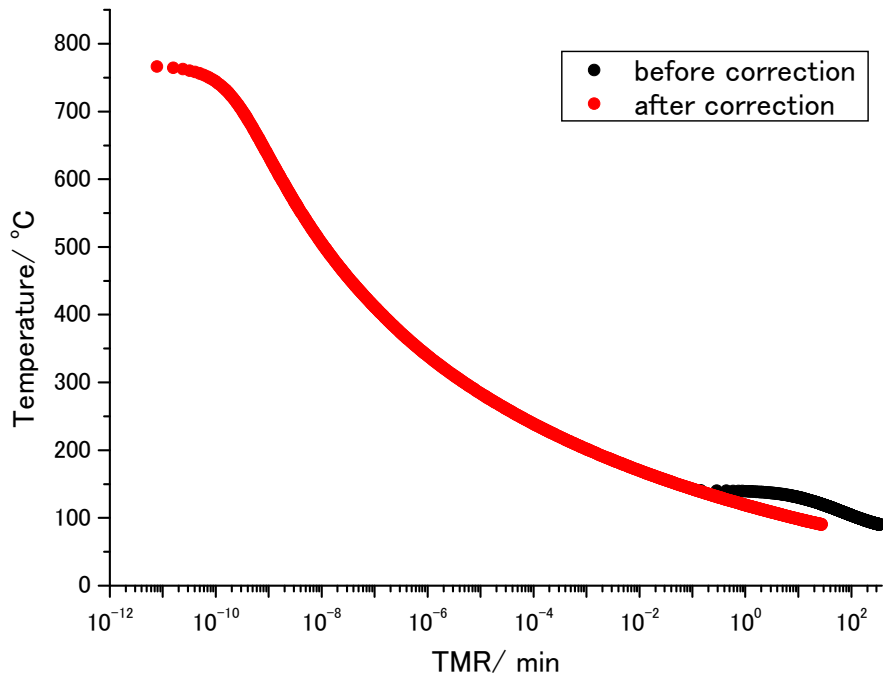
b) Weight: 0.356 g



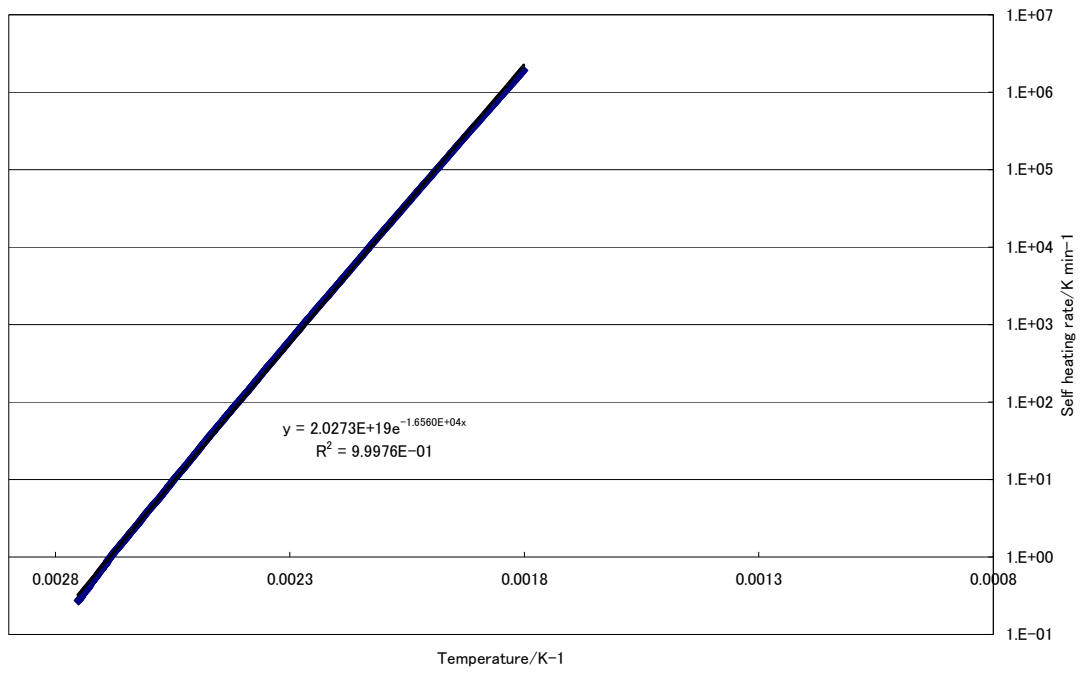
Time vs. Temperature and Pressure



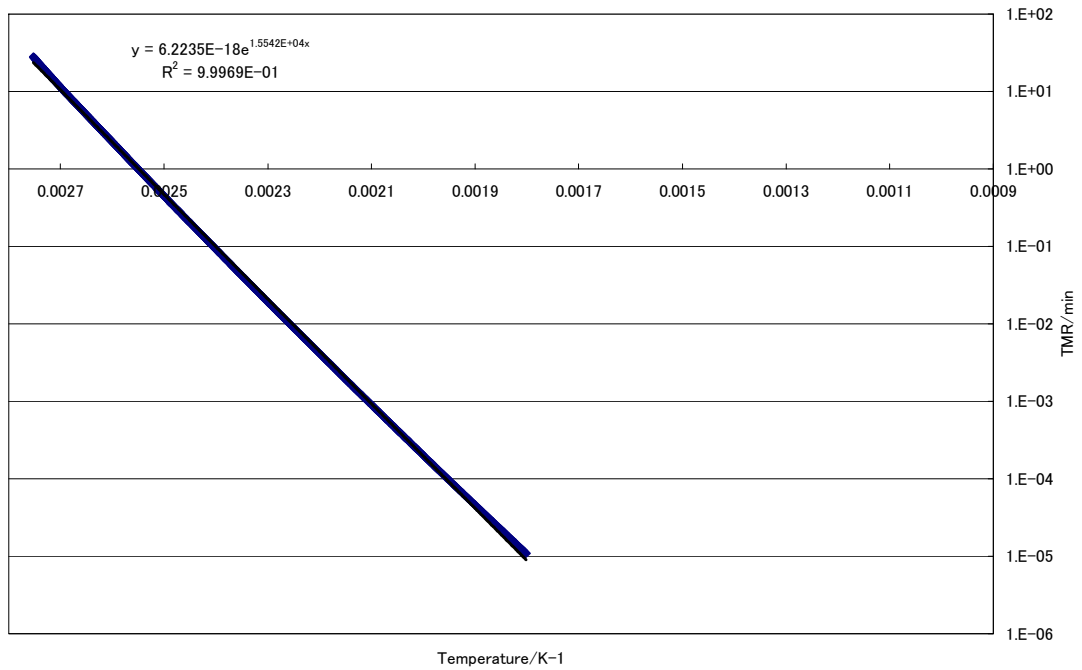
Temperature vs. Self heating rate



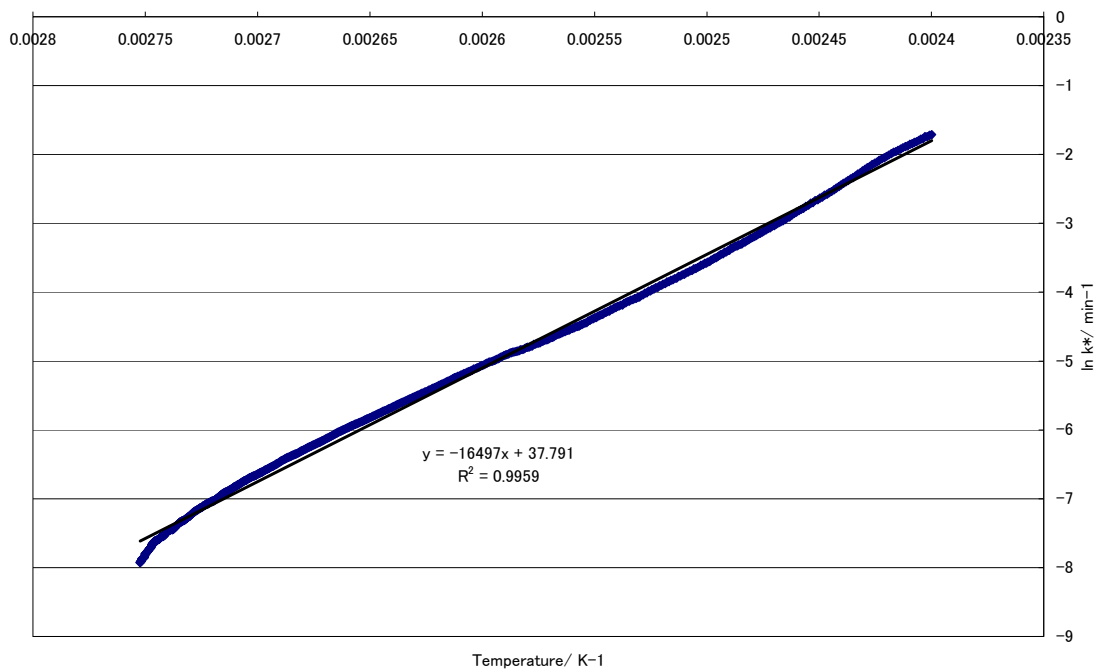
TMR vs. Temperature



Temperature vs. Self heating rate (approximate calculation)

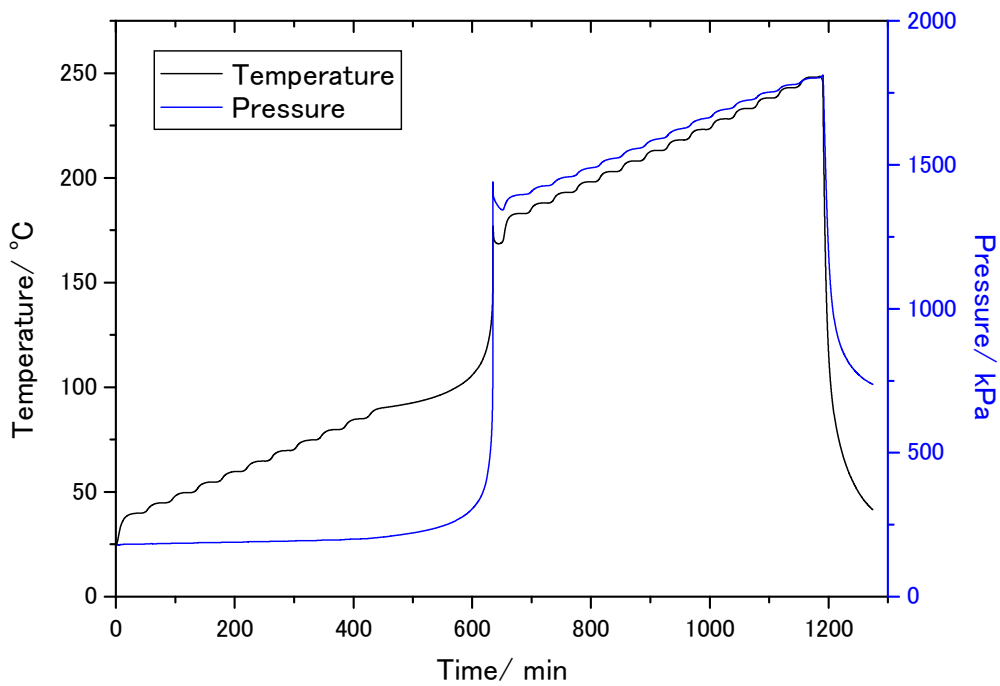


Temperature vs. TMR (approximate calculation)

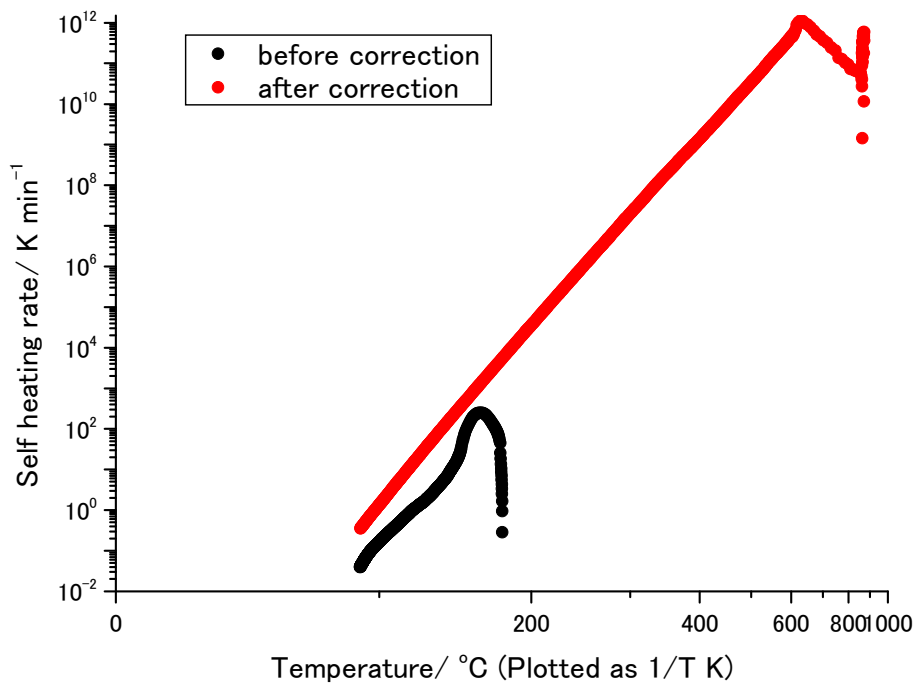


Arrhenius equation (approximate calculation)

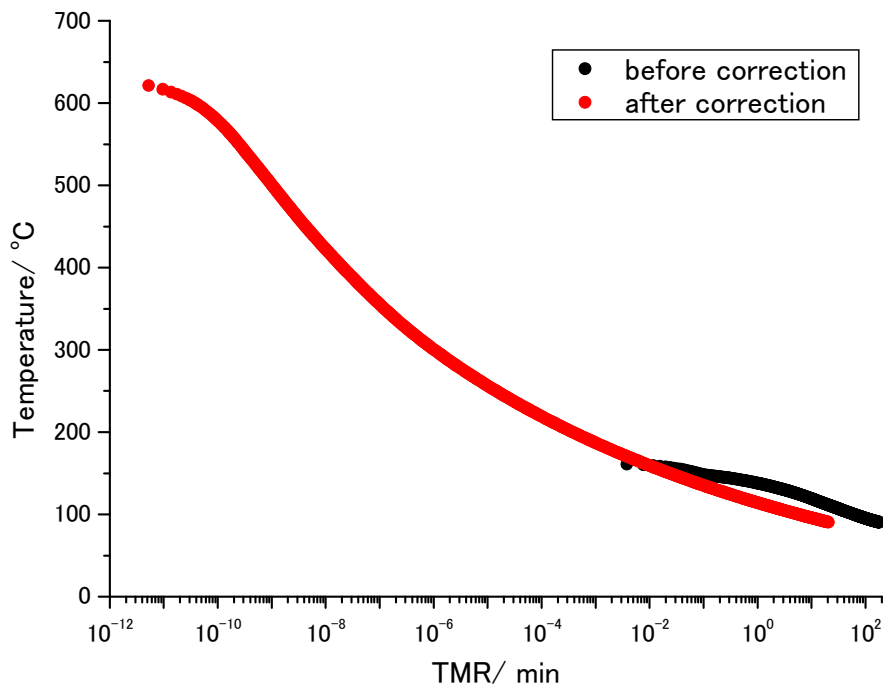
c) Weight: 0.522 g



Time vs. Temperature and Pressure

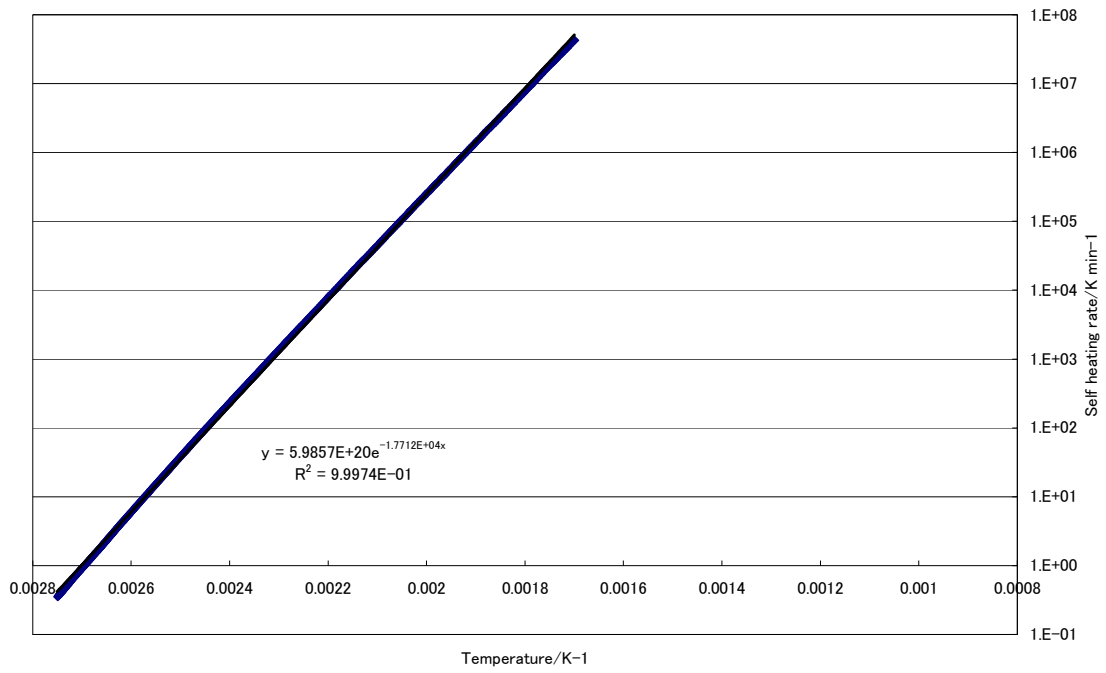


Temperature vs. Self heating rate

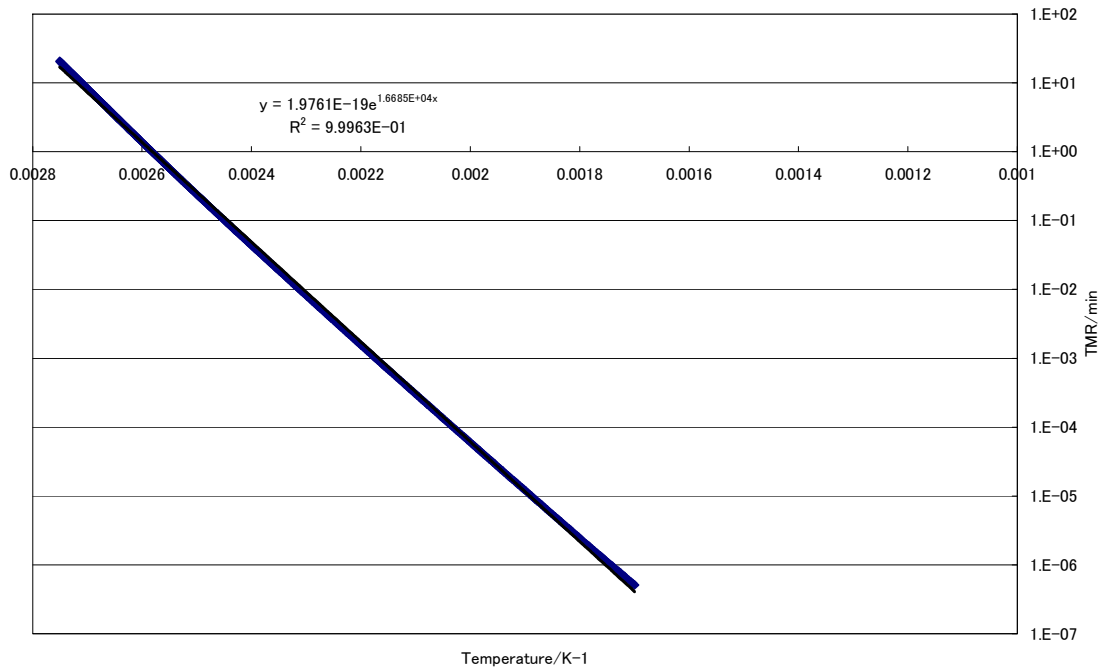


TMR vs. Temperature

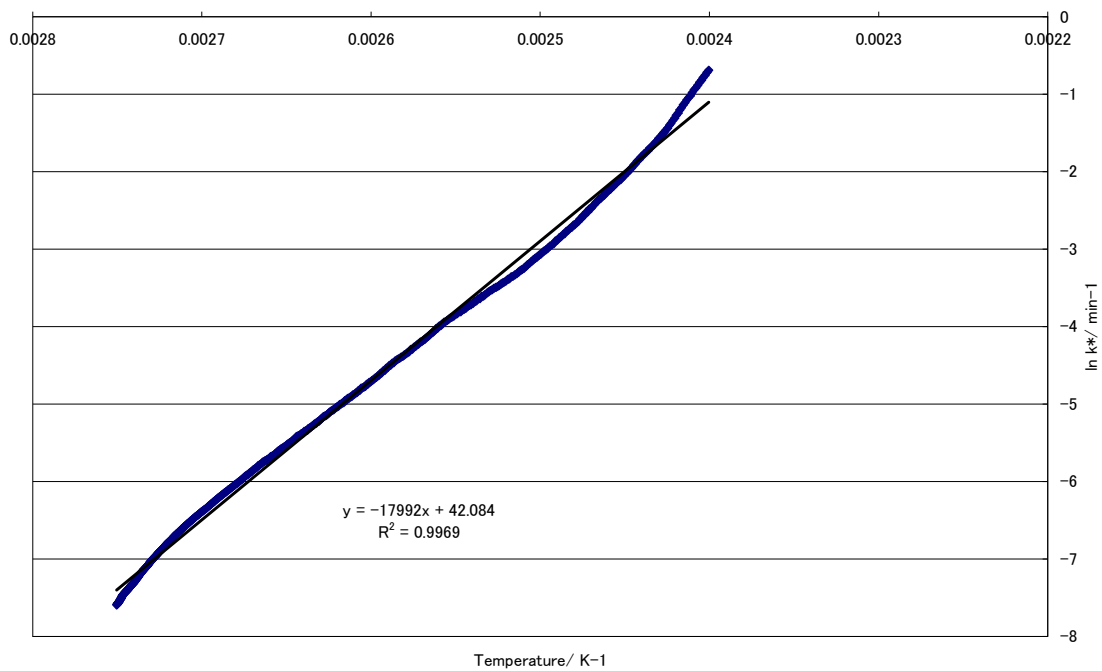




Temperature vs. Self heating rate (approximate calculation)

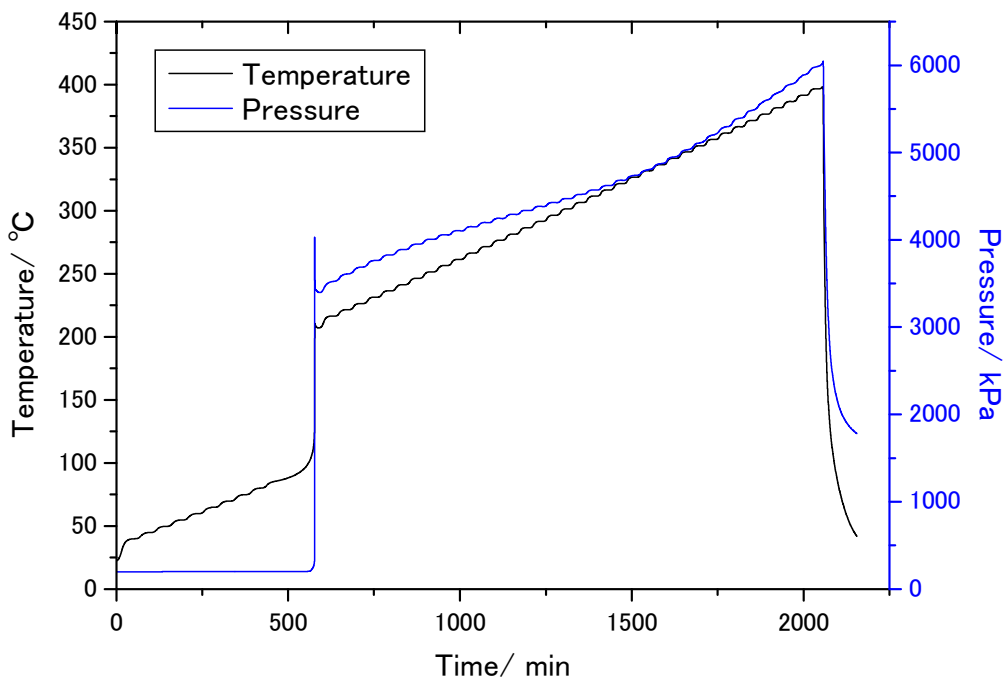


Temperature vs. TMR (approximate calculation)

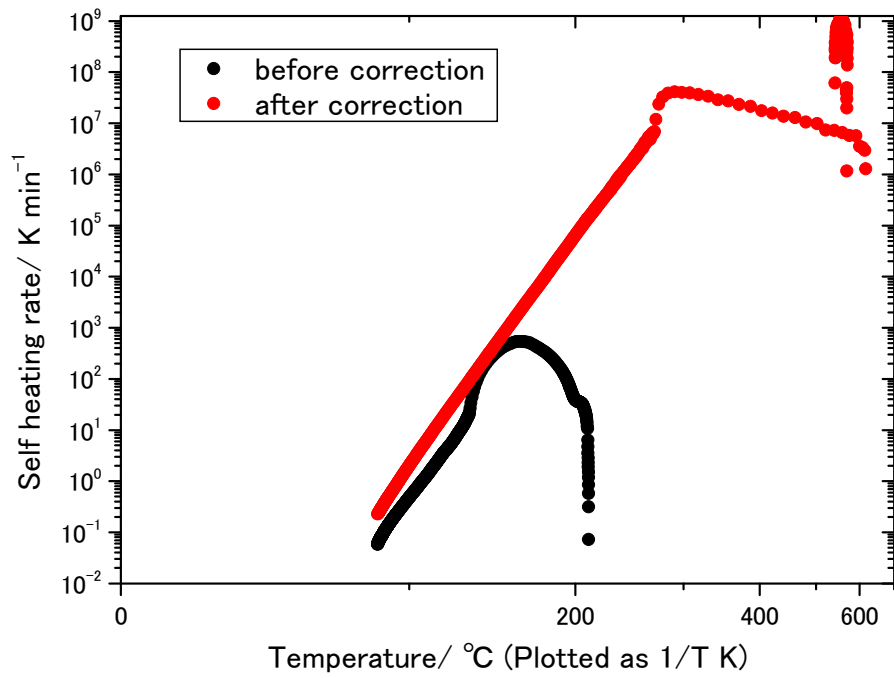


Arrhenius equation (approximate calculation)

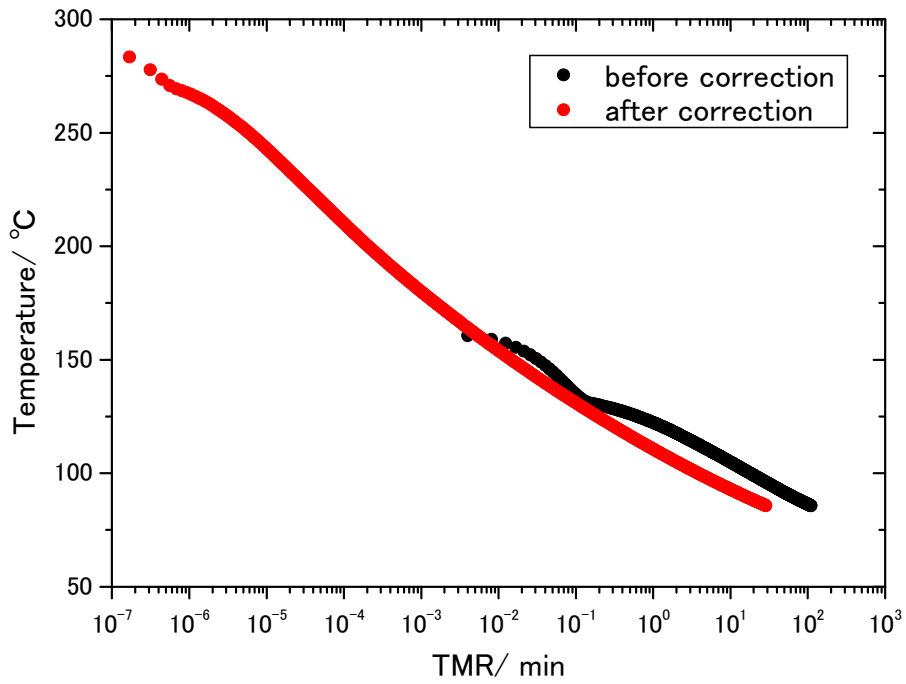
d) Weight: 1.419 g



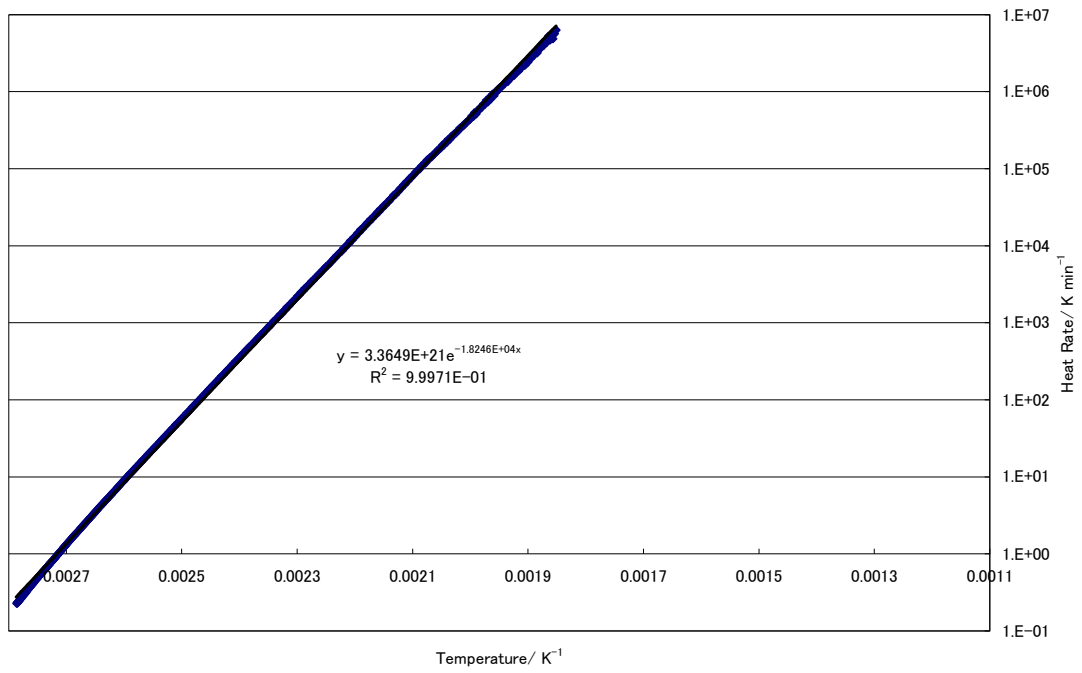
Time vs. Temperature and Pressure



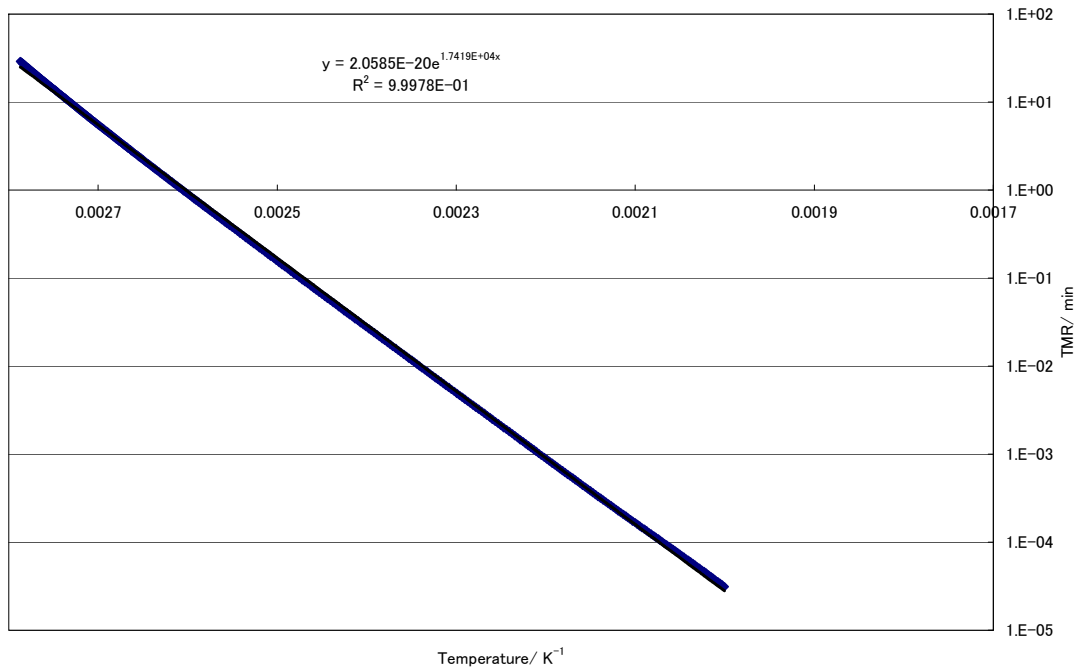
Temperature vs. Self heating rate



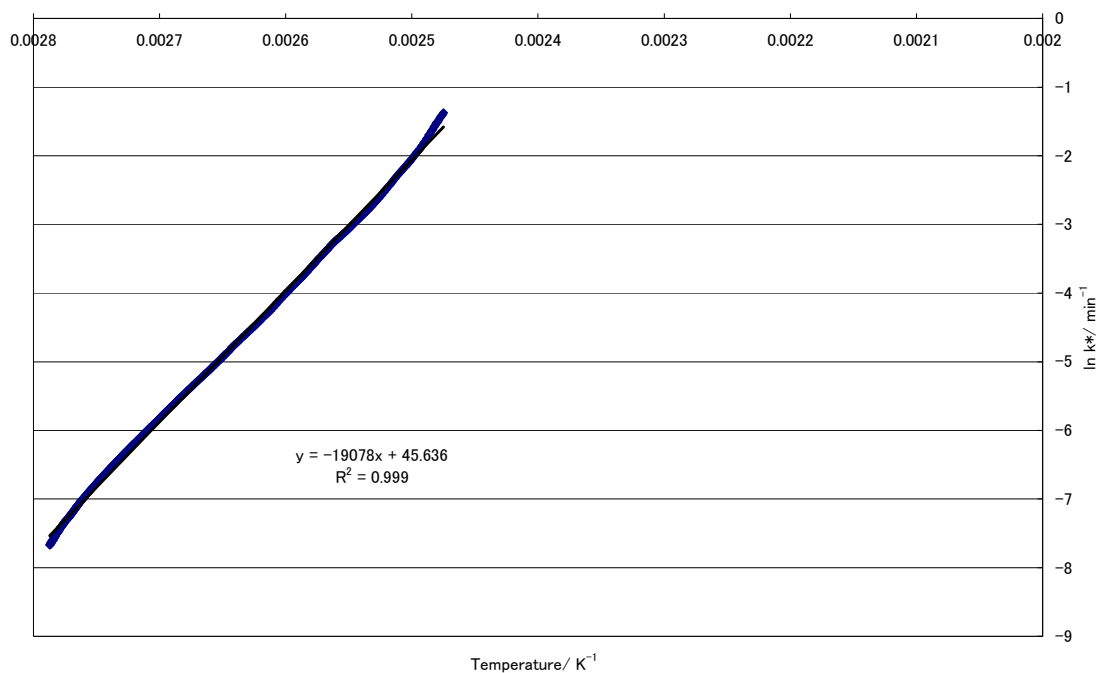
TMR vs. Temperature



Temperature vs. Self heating rate (approximate calculation)



Temperature vs. TMR (approximate calculation)



Arrhenius equation (approximate calculation)

a) Weight: 0.263 g

	Date	2009/7/27
Measuring conditions	ARC device	NewARC (TIAX, LLC)
	Operating Institute	AIST
	Operator	Y. S.
	Material of Bomb	Hastelloy C
	Weight of Bomb (g)	20.5451
	Volume of Bomb (mL)	about 9
	Weight of sample (g)	0.2627
	Weight of residue (g)	—
	Specific heat of Bomb (J K <sup>-1</sup> g <sup>-1</sup> )	0.419
	Specific heat of sample (J K <sup>-1</sup> g <sup>-1</sup> )	2.093
	φ facotr	16.66
	Start temperature (°C)	40
	End temperature (°C)	220
	Temperature increment (K)	5
	Waiting time (min)	15
Searching time (min)	15	
Exothermic threshold (K min <sup>-1</sup> )	0.02	

	Logging intervals (°C)	0.15
	Pressure limit (kPa)	20000
	Atmosphere	Air, atmospheric pressure
Results	T <sub>o</sub> , Exothermic temperature (°C)	95.58
	Self heating rate at T <sub>o</sub> (K min <sup>-1</sup> )	0.047
	Pressure at T <sub>o</sub> (kPa)	213.78
	Temperature at maximum self heating rate (°C)	130.75
	Maximum self heating rate (K min <sup>-1</sup> )	0.3917
	Pressure at maximum self heating rate (kPa)	530.65
	Pressure rising rate at maximum self heating rate (kPa min <sup>-1</sup> )	4.8892
	Maximum pressure (kPa)	676.06
	Maximum pressure rising rate (kPa min <sup>-1</sup> )	4.9368
	Temperature at maximum pressure rising rate (°C)	131.58
	Time to maximum rate (min)	231.88
	Maximum temperature (°C)	140.94
	Adiabatic temperature rise (°C)	45.36
	Activation energy (kJ mol <sup>-1</sup> )	122.2
	Heat of decomposition (J g <sup>-1</sup> )	1582
Corrected results	T <sub>ARC</sub> , Exothermic temperature (°C)	63.90
	Time of maximum rate at T <sub>ARC</sub> (min)	348.62
	Self heating rate at T <sub>ARC</sub> (K min <sup>-1</sup> )	0.02
	Maximum self heating rate (K min <sup>-1</sup> )	1.4982 × 10 <sup>10</sup>
	Maximum temperature (°C)	849.39
	Adiabatic temperature rise (°C)	785.49
	Heat of decomposition (J g <sup>-1</sup> )	1644

b) Weight: 0.356 g

	Date	2009/7/29
Measuring conditions	ARC device	NewARC (TIAX, LLC)
	Operating Institute	AIST
	Operator	Y. S.

	Material of Bomb	Hastelloy C
	Weight of Bomb (g)	20.5451
	Volume of Bomb (mL)	about 9
	Weight of sample (g)	0.3553
	Weight of residue (g)	—
	Specific heat of Bomb ( $\text{J K}^{-1} \text{g}^{-1}$ )	0.419
	Specific heat of sample ( $\text{J K}^{-1} \text{g}^{-1}$ )	2.093
	$\phi$ facotr	12.58
	Start temperature ( $^{\circ}\text{C}$ )	40
	End temperature ( $^{\circ}\text{C}$ )	220
	Temperature increment (K)	5
	Waiting time (min)	15
	Searching time (min)	15
	Exothermic threshold ( $\text{K min}^{-1}$ )	0.02
	Logging intervals ( $^{\circ}\text{C}$ )	0.15
	Pressure limit (kPa)	20000
	Atmosphere	Air, atmospheric pressure
Results	$T_o$ , Exothermic temperature ( $^{\circ}\text{C}$ )	90.18
	Self heating rate at $T_o$ ( $\text{K min}^{-1}$ )	0.021
	Pressure at $T_o$ (kPa)	206.23
	Temperature at maximum self heating rate ( $^{\circ}\text{C}$ )	140.43
	Maximum self heating rate ( $\text{K min}^{-1}$ )	1.2391
	Pressure at maximum self heating rate (kPa)	693.87
	Pressure rising rate at maximum self heating rate ( $\text{kPa min}^{-1}$ )	16.008
	Maximum pressure (kPa)	842.44
	Maximum pressure rising rate ( $\text{kPa min}^{-1}$ )	16.428
	Temperature at maximum pressure rising rate ( $^{\circ}\text{C}$ )	141.50
	Time to maximum rate (min)	343.86
	Maximum temperature ( $^{\circ}\text{C}$ )	149.72
	Adiabatic temperature rise ( $^{\circ}\text{C}$ )	59.54
	Activation energy ( $\text{kJ mol}^{-1}$ )	137.2

	Heat of decomposition ( $\text{J g}^{-1}$ )	1568
Corrected results	$T_{\text{ARC}}$ , Exothermic temperature ( $^{\circ}\text{C}$ )	69.23
	Time of maximum rate at $T_{\text{ARC}}$ (min)	322.75
	Self heating rate at $T_{\text{ARC}}$ ( $\text{K min}^{-1}$ )	0.02
	Maximum self heating rate ( $\text{K min}^{-1}$ )	$2.4863 \times 10^{11}$
	Maximum temperature ( $^{\circ}\text{C}$ )	837.13
	Adiabatic temperature rise ( $^{\circ}\text{C}$ )	785.49
	Heat of decomposition ( $\text{J g}^{-1}$ )	1607

c) Weight: 0.522 g

	Date	2009/7/24
Measuring conditions	ARC device	NewARC (TIAX, LLC)
	Operating Institute	AIST
	Operator	Y. S.
	Material of Bomb	Hastelloy C
	Weight of Bomb (g)	20.5451
	Volume of Bomb (mL)	about 9
	Weight of sample (g)	0.5223
	Weight of residue (g)	—
	Specific heat of Bomb ( $\text{J K}^{-1} \text{g}^{-1}$ )	0.419
	Specific heat of sample ( $\text{J K}^{-1} \text{g}^{-1}$ )	2.093
	$\phi$ facotr	8.875
	Start temperature ( $^{\circ}\text{C}$ )	40
	End temperature ( $^{\circ}\text{C}$ )	250
	Temperature increment (K)	5
	Waiting time (min)	15
	Searching time (min)	15
	Exothermic threshold ( $\text{K min}^{-1}$ )	0.02
	Logging intervals ( $^{\circ}\text{C}$ )	0.15
	Pressure limit (kPa)	20000
	Atmosphere	Air, atmospheric pressure
Results	$T_o$ , Exothermic temperature ( $^{\circ}\text{C}$ )	90.44
	Self heating rate at $T_o$ ( $\text{K min}^{-1}$ )	0.039
	Pressure at $T_o$ (kPa)	208.76
	Temperature at maximum self heating	161.58



	rate (°C)	
	Maximum self heating rate (K min <sup>-1</sup> )	247.79
	Pressure at maximum self heating rate (kPa)	1338.0
	Pressure rising rate at maximum self heating rate (kPa min <sup>-1</sup> )	3994.4
	Maximum pressure (kPa)	1439.5
	Maximum pressure rising rate (kPa min <sup>-1</sup> )	7654.3
	Temperature at maximum pressure rising rate (°C)	155.58
	Time to maximum rate (min)	178.74
	Maximum temperature (°C)	177.09
	Adiabatic temperature rise (°C)	86.65
	Activation energy (kJ mol <sup>-1</sup> )	149.6
	Heat of decomposition (J g <sup>-1</sup> )	1610
Corrected results	T <sub>ARC</sub> , Exothermic temperature (°C)	69.09
	Time of maximum rate at T <sub>ARC</sub> (min)	294.10
	Self heating rate at T <sub>ARC</sub> (K min <sup>-1</sup> )	0.02
	Maximum self heating rate (K min <sup>-1</sup> )	1.1104 × 10 <sup>12</sup>
	Maximum temperature (°C)	872.04
	Adiabatic temperature rise (°C)	802.95
	Heat of decomposition (J g <sup>-1</sup> )	1681

d) Weight: 1.419 g

	Date	2009/2/10
Measuring conditions	ARC device	NewARC (TIAX, LLC)
	Operating Institute	AIST
	Operator	Y. S.
	Material of Bomb	Hastelloy C
	Weight of Bomb (g)	20.1738
	Volume of Bomb (mL)	about 9
	Weight of sample (g)	1.4188
	Weight of residue (g)	0.7258
	Specific heat of Bomb (J K <sup>-1</sup> g <sup>-1</sup> )	0.419
	Specific heat of sample (J K <sup>-1</sup> g <sup>-1</sup> )	2.093

	$\phi$ facotr	3.847
	Start temperature (°C)	40
	End temperature (°C)	400
	Temperature increment (K)	5
	Waiting time (min)	15
	Searching time (min)	15
	Exothermic threshold (K min <sup>-1</sup> )	0.02
	Logging intervals (°C)	0.15
	Pressure limit (kPa)	20000
	Atmosphere	Air, atmospheric pressure
Results	T <sub>o</sub> , Exothermic temperature (°C)	85.664
	Self heating rate at T <sub>o</sub> (K min <sup>-1</sup> )	0.058
	Pressure at T <sub>o</sub> (kPa)	201.73
	Temperature at maximum self heating rate (°C)	162.37
	Maximum self heating rate (K min <sup>-1</sup> )	537.49
	Pressure at maximum self heating rate (kPa)	3603.8
	Pressure rising rate at maximum self heating rate (kPa min <sup>-1</sup> )	13934
	Maximum pressure (kPa)	4029.4
	Maximum pressure rising rate (kPa min <sup>-1</sup> )	37311
	Temperature at maximum pressure rising rate (°C)	148.94
	Time to maximum rate (min)	110.56
	Maximum temperature (°C)	210.51
	Adiabatic temperature rise (°C)	124.85
	Activation energy (kJ mol <sup>-1</sup> )	158.6
Heat of decomposition (J g <sup>-1</sup> )	1005	
Corrected results	T <sub>ARC</sub> , Exothermic temperature (°C)	68.03
	Time of maximum rate at T <sub>ARC</sub> (min)	306.57
	Self heating rate at T <sub>ARC</sub> (K min <sup>-1</sup> )	0.02
	Maximum self heating rate (K min <sup>-1</sup> )	4.124 × 10 <sup>7</sup>
	Maximum temperature (°C)	568.11
	Adiabatic temperature rise (°C)	500.08

	Heat of decomposition (J g <sup>-1</sup> )	1047
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