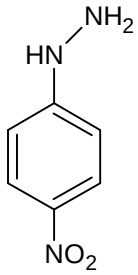
産業技術総合研究所　高エネルギー物質研究グループ
発熱分解エネルギー測定の標準化　　熱分析結果

4-Nitrophenylhydrazine　　$C_6H_7N_3O_2$　　NPH

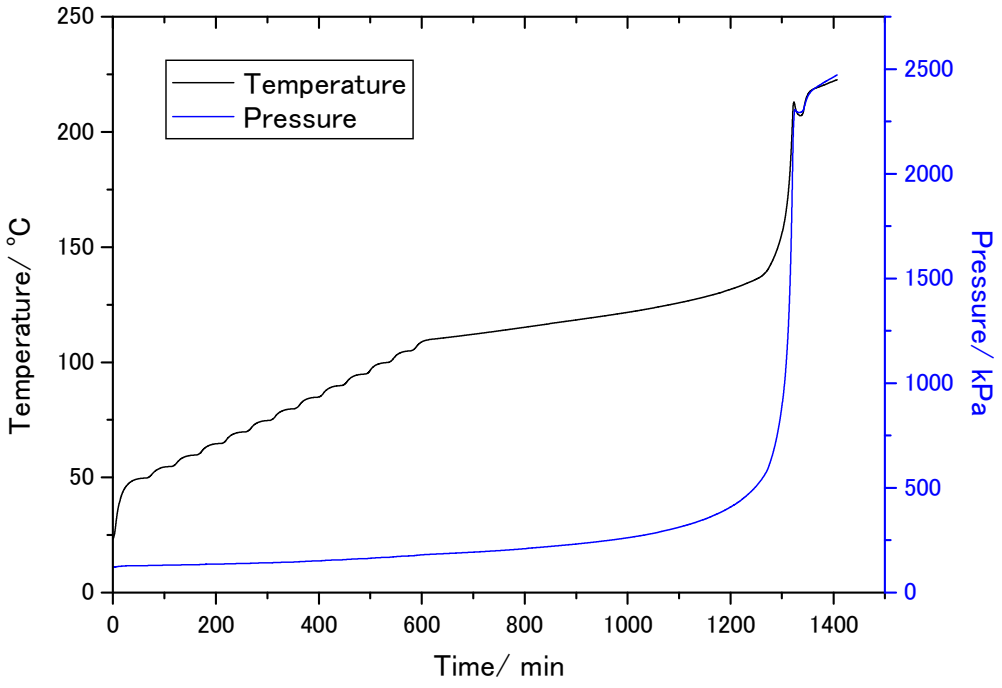


ARC device: New ARC (TIAX, LLC)

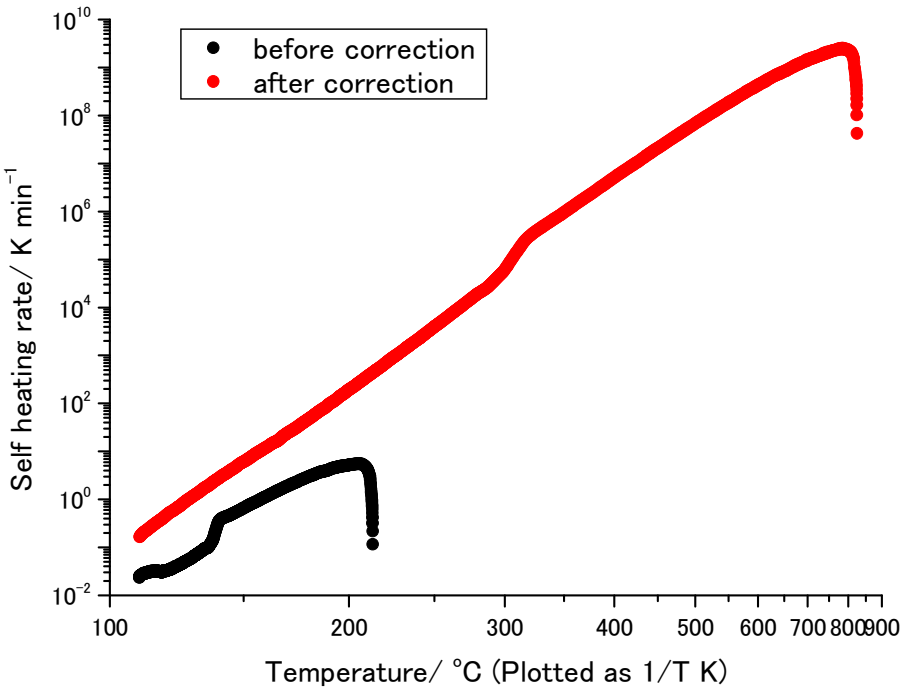
Date: 2010/2

Operator: Y. S.

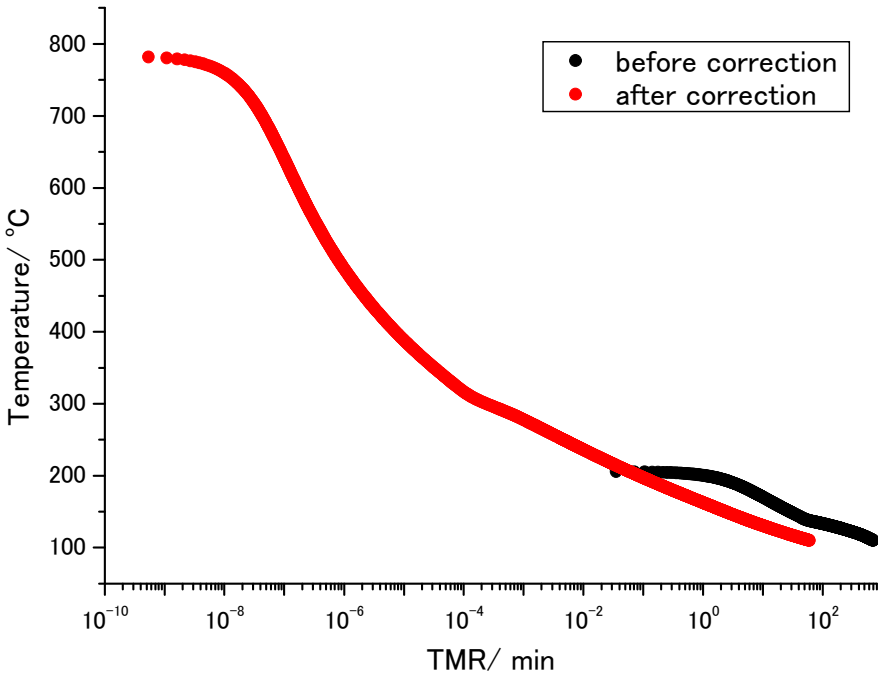
a) Weight: 0.681 g



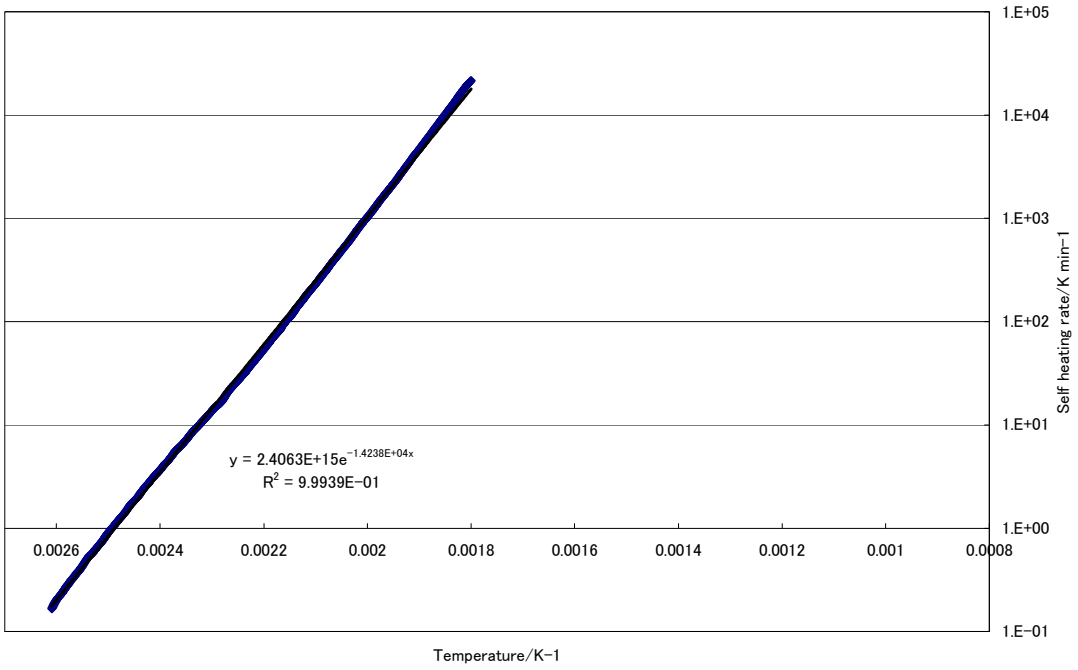
Time vs. Temperature and Pressure



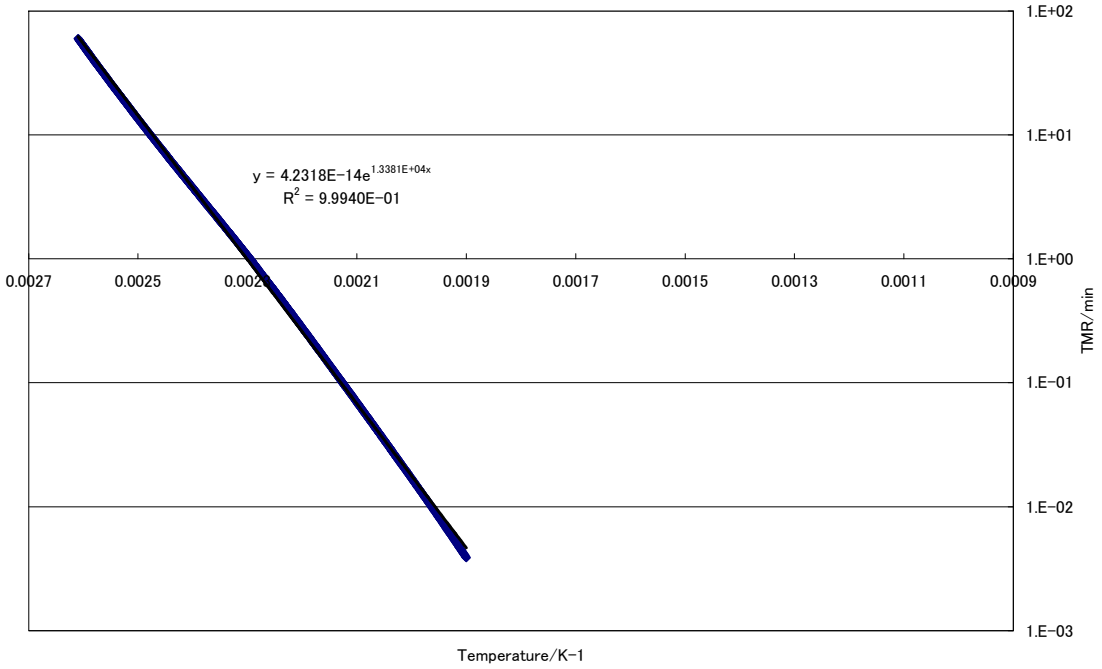
Temperature vs. Self heating rate



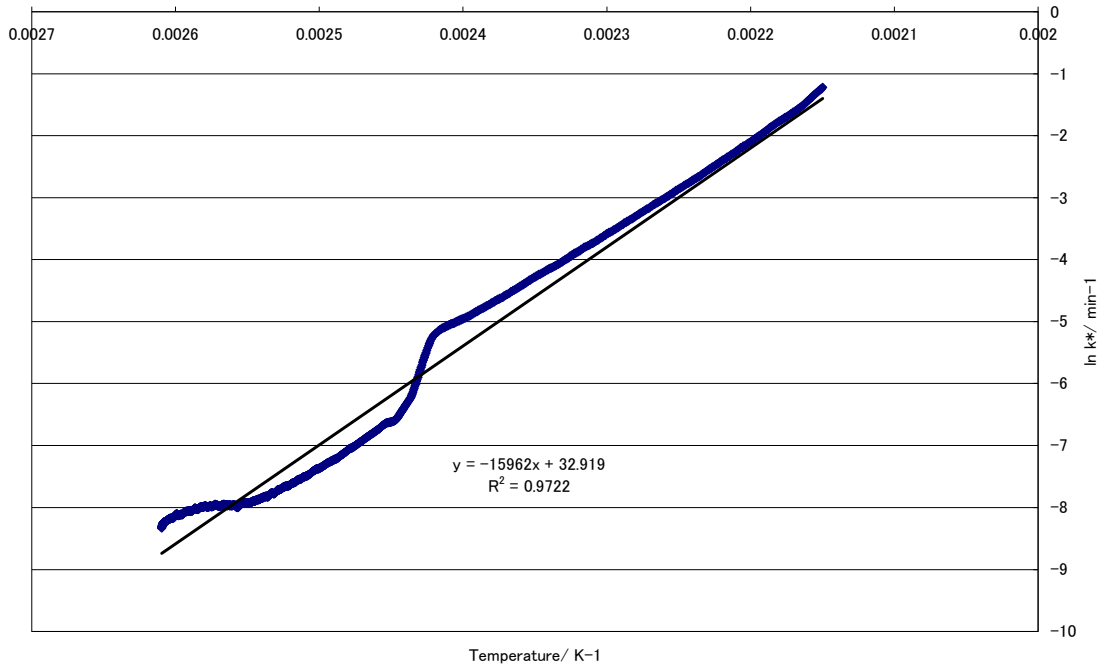
TMR vs. Temperature



Temperature vs. Self heating rate (approximate calculation)

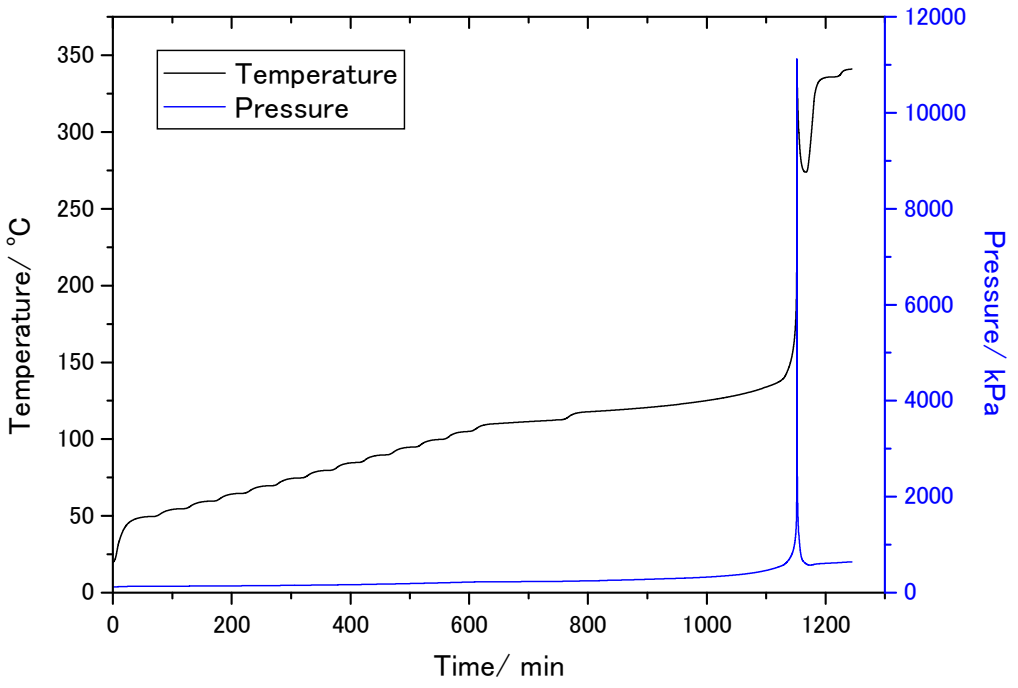


Temperature vs. TMR (approximate calculation)

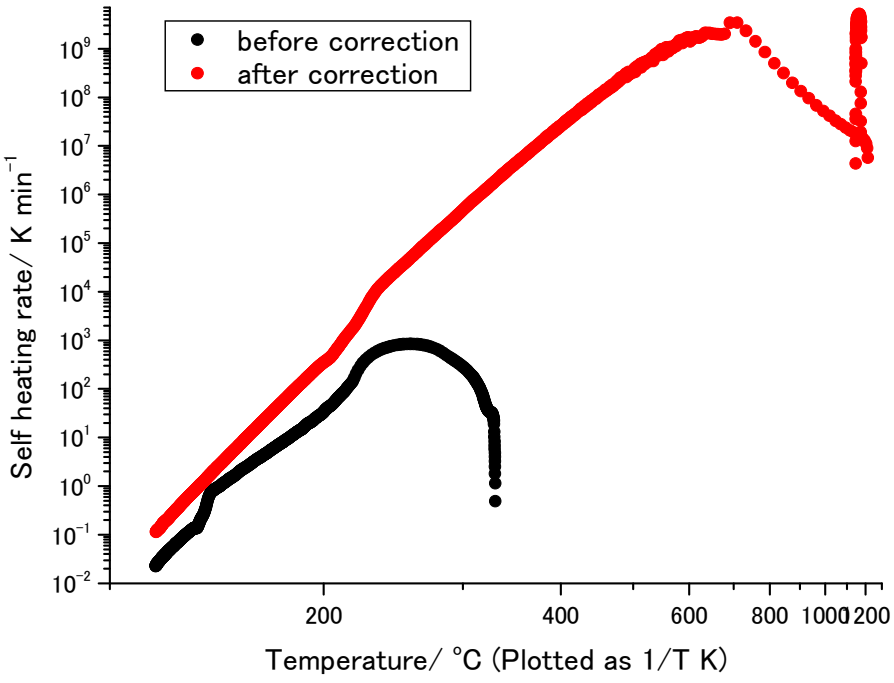


Arrhenius equation (approximate calculation)

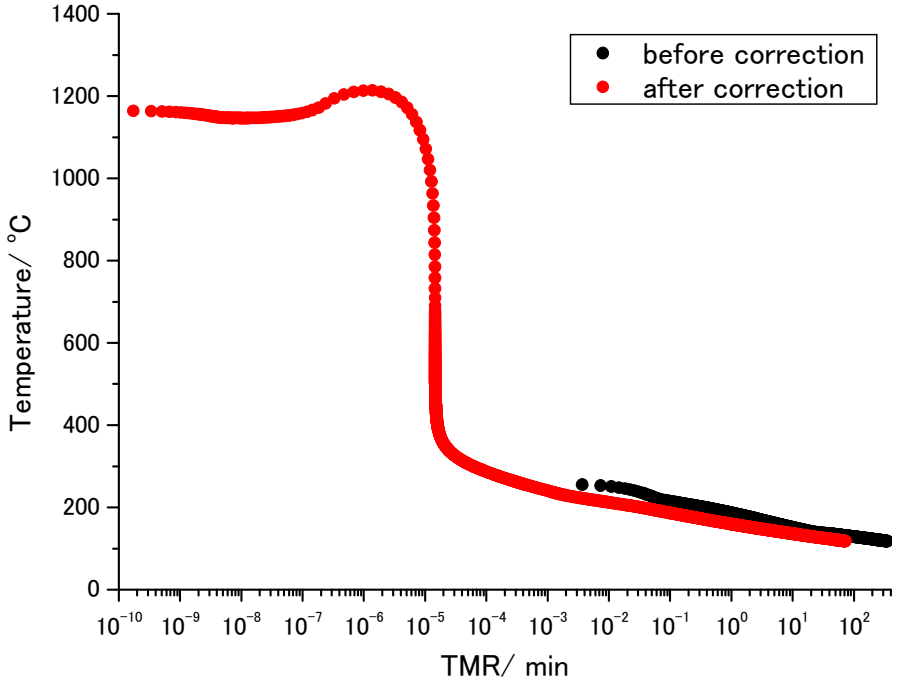
b) Weight: 1.022 g



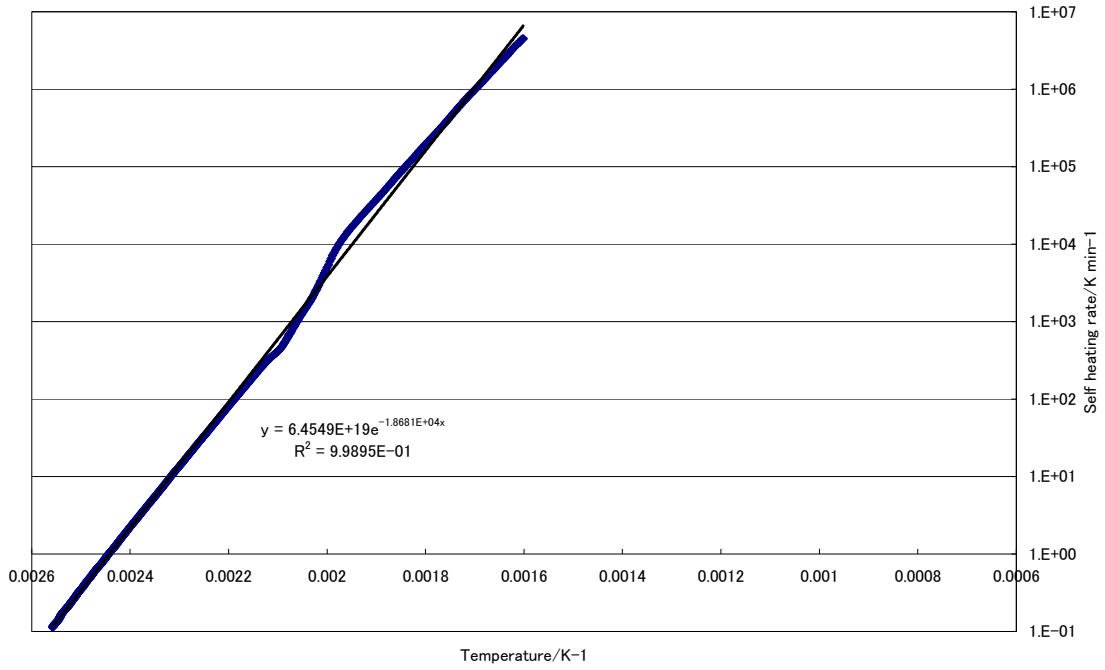
Time vs. Temperature and Pressure



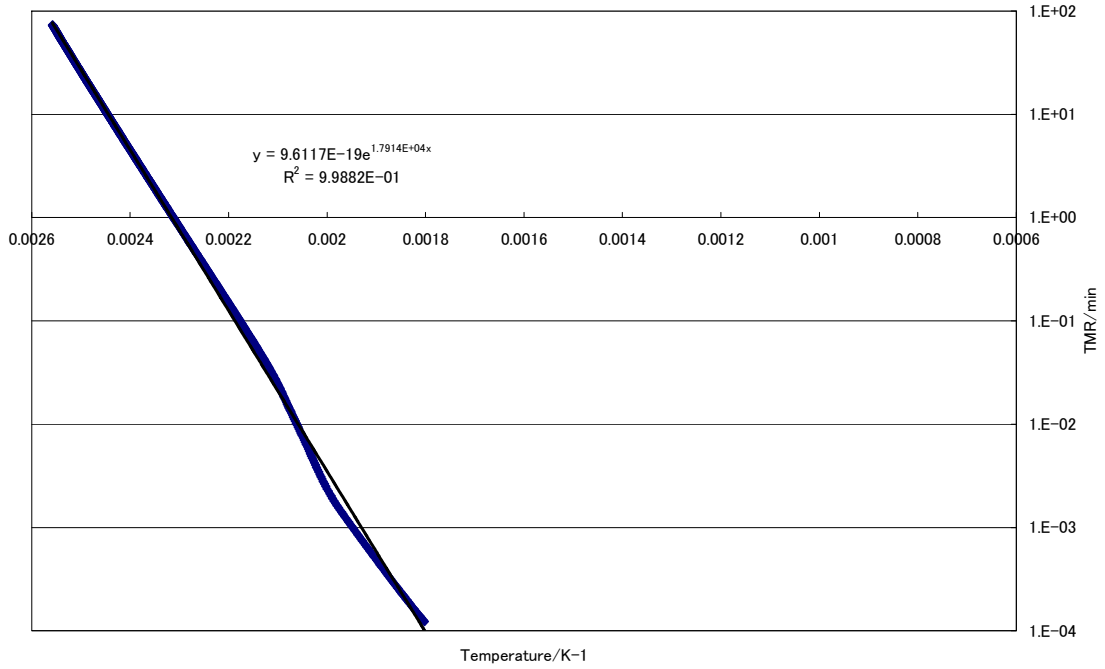
Temperature vs. Self heating rate



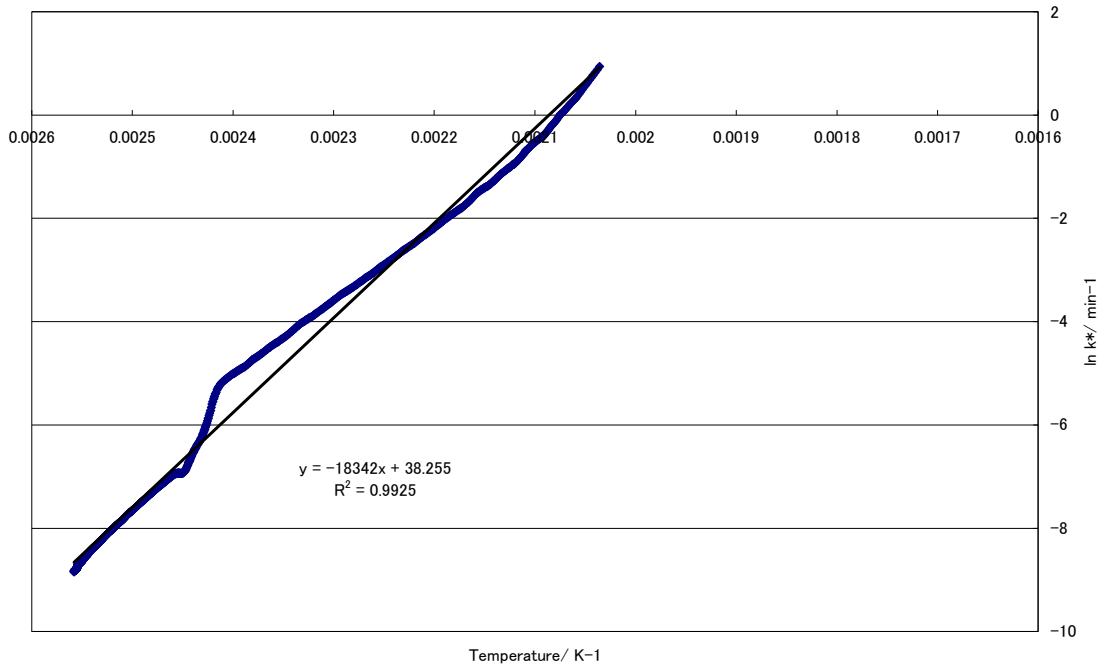
TMR vs. Temperature



Temperature vs. Self heating rate (approximate calculation)



Temperature vs. TMR (approximate calculation)



Arrhenius equation (approximate calculation)

a) Weight: 0.681 g

	Date	2010/2/23
Measuring conditions	ARC device	NewARC (TIAX, LLC)
	Operating Institute	AIST
	Operator	Y. S.
	Material of Bomb	Hastelloy C
	Weight of Bomb (g)	20.2106
	Volume of Bomb (mL)	about 9
	Weight of sample (g)	0.6808
	Weight of residue (g)	—
	Specific heat of Bomb (J K^{-1} g^{-1})	0.419
	Specific heat of sample (J K^{-1} g^{-1})	2.093
	ϕ facotr	6.943
	Start temperature (℃)	50
	End temperature (℃)	222
	Temperature increment (K)	5
	Waiting time (min)	15
	Searching time (min)	15
	Exothermic threshold (K min^{-1})	0.02

	Logging intervals (℃)	0.15
	Pressure limit (kPa)	20000
	Atmosphere	Air, atmospheric pressure
Results	T_o, Exothermic temperature (℃)	110.04
	Self heating rate at T_o (K min^{-1})	0.023
	Pressure at T_o (kPa)	183.51
	Temperature at maximum self heating rate (℃)	205.82
	Maximum self heating rate (K min^{-1})	5.5432
	Pressure at maximum self heating rate (kPa)	2018.4
	Pressure rising rate at maximum self heating rate (kPa min^{-1})	139.09
	Maximum pressure (kPa)	2307.9
	Maximum pressure rising rate (kPa min^{-1})	139.68
	Temperature at maximum pressure rising rate (℃)	204.64
	Time to maximum rate (min)	698.22
	Maximum temperature (℃)	212.91
	Adiabatic temperature rise (℃)	102.87
	Activation energy (kJ mol^{-1})	132.7
	Heat of decomposition (J g^{-1})	1495
Corrected results	T_{ARC}, Exothermic temperature (℃)	88.87
	Time of maximum rate at T_{ARC} (min)	476.96
	Self heating rate at T_{ARC} (K min^{-1})	0.02
	Maximum self heating rate (K min^{-1})	2.5305×10^9
	Maximum temperature (℃)	824.40
	Adiabatic temperature rise (℃)	735.53
	Heat of decomposition (J g^{-1})	1539

b) Weight: 1.022 g

	Date	2010/2/22
Measuring conditions	ARC device	NewARC (TIAX, LLC)
	Operating Institute	AIST
	Operator	Y. S.

	Material of Bomb	Hastelloy C
	Weight of Bomb (g)	20.3220
	Volume of Bomb (mL)	about 9
	Weight of sample (g)	1.0221
	Weight of residue (g)	—
	Specific heat of Bomb (J K^{-1} g^{-1})	0.419
	Specific heat of sample (J K^{-1} g^{-1})	2.093
	ϕ facotr	4.980
	Start temperature (℃)	50
	End temperature (℃)	341
	Temperature increment (K)	5
	Waiting time (min)	15
	Searching time (min)	15
	Exothermic threshold (K min^{-1})	0.02
	Logging intervals (℃)	0.15
	Pressure limit (kPa)	20000
	Atmosphere	Air, atmospheric pressure
Results	T_o, Exothermic temperature (℃)	117.79
	Self heating rate at T_o (K min^{-1})	0.023
	Pressure at T_o (kPa)	247.05
	Temperature at maximum self heating rate (℃)	257.71
	Maximum self heating rate (K min^{-1})	842.69
	Pressure at maximum self heating rate (kPa)	9528.6
	Pressure rising rate at maximum self heating rate (kPa min^{-1})	64120
	Maximum pressure (kPa)	11119
	Maximum pressure rising rate (kPa min^{-1})	100000
	Temperature at maximum pressure rising rate (℃)	234.23
	Time to maximum rate (min)	351.76
	Maximum temperature (℃)	329.56
	Adiabatic temperature rise (℃)	211.77
	Activation energy (kJ mol^{-1})	152.5

	Heat of decomposition (J g^{-1})	2207
Corrected results	T_{ARC}, Exothermic temperature (℃)	104.05
	Time of maximum rate at T_{ARC} (min)	405.72
	Self heating rate at T_{ARC} (K min^{-1})	0.02
	Maximum self heating rate (K min^{-1})	5.1461×10^{9}
	Maximum temperature (℃)	1213.7
	Adiabatic temperature rise (℃)	1109.6
	Heat of decomposition (J g^{-1})	2322