Kinetics of thermal decomposition of a spirooxindole compound under non-isothermal condition.

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Table S1. Temperatures corresponding to the various degrees of conversion at different heating rates for AIOIPD (stage-I)

α	Heating Rates				E_a (kJ /mol)		
	10K/min	15K/min	20K/min	30K/min	Friedman method	KAS method	FWO method
0.12	495.98	498.29	500.62	505.28	235.91	231.65	228.16
0.14	499.33	501.64	503.98	508.72	234.43	232.26	228.80
0.16	501.83	504.32	506.67	511.35	232.87	232.99	229.53
0.18	504.00	506.49	508.86	513.61	231.43	232.54	229.14
0.20	505.99	508.34	510.88	515.63	230.89	232.02	228.68
0.22	507.64	510.01	512.56	517.36	229.70	231.61	228.31
0.24	509.14	511.52	514.06	518.94	228.12	230.96	227.72
0.26	510.47	513.02	515.41	520.38	229.93	231.07	227.85
0.28	511.75	514.36	516.60	521.74	230.05	230.62	227.44
0.30	513.00	515.90	518.04	523.11	229.50	231.40	228.20
0.32	514.99	517.98	519.98	525.21	230.54	230.97	227.83
0.34	515.99	519.09	521.26	526.26	229.52	231.72	228.55
0.36	516.77	519.90	522.09	527.08	229.78	231.65	228.50
0.38	517.91	521.25	523.26	528.33	228.35	231.37	228.25
0.40	519.22	522.88	524.80	529.75	229.30	231.72	228.60
0.42	520.18	523.68	525.65	530.73	228.56	231.22	228.15
0.44	521.20	524.52	526.66	531.75	228.67	231.04	227.99
0.46	522.49	525.64	527.80	533.06	229.76	230.42	227.43
0.48	523.66	526.69	528.88	534.25	229.58	229.97	227.01
0.50	524.83	527.90	529.96	535.48	230.50	229.65	226.73
0.52	525.69	528.85	530.80	536.40	229.23	229.50	226.60

Table contd..,

0.54	526.89	529.88	532.00	537.59	230.39	229.57	226.69
0.56	527.55	530.62	532.90	538.28	229.55	230.39	227.48
0.58	529.02	531.98	534.69	539.74	229.38	230.97	228.05
0.60	530.18	532.99	535.92	540.89	228.98	230.72	227.83
0.62	531.81	534.62	537.42	542.62	228.09	229.96	227.13
0.64	532.56	535.42	538.30	543.40	229.75	230.24	227.41
0.66	534.10	537.28	539.94	545.10	228.19	230.54	227.72
0.68	536.45	539.52	542.08	547.54	229.38	229.68	226.95
0.70	537.59	540.89	543.34	548.78	229.38	230.13	227.39
0.72	539.16	542.92	545.12	550.51	228.92	230.75	228.00
0.74	540.76	544.96	546.85	552.26	229.06	230.75	228.03
0.76	542.18	546.62	548.82	553.72	229.43	231.51	228.78
0.78	543.47	547.86	549.94	555.09	230.03	231.04	228.35
0.80	545.85	550.23	551.99	557.60	230.81	230.26	227.65
0.82	547.19	551.67	553.26	559.02	229.99	229.83	227.26
0.84	549.02	553.09	555.37	560.79	230.75	231.46	228.84
0.86	550.82	554.90	556.98	562.69	230.99	230.86	228.29
0.88	552.63	556.93	558.95	564.61	230.50	230.99	228.45
0.90	554.20	558.74	560.69	566.28	230.20	231.04	228.52
0.92	556.20	560.75	562.71	568.39	228.11	230.49	228.03
0.94	558.30	562.92	564.90	570.63	225.32	229.62	227.24
0.96	560.98	565.11	567.80	573.34	222.31	229.19	226.87
0.98	563.45	567.69	570.00	576.05	221.24	227.05	224.88
					229.49±0.35	230.76±0.15	227.85±0.12

Table S2. Temperatures corresponding to the various degrees of conversion at different heating rates for AIOIPD (stage-II)

α	Heating Rates				E_a (kJ/mol)		
	10K/min	15K/min	20K/min	30K/min	Friedman method	KAS method	FWO method
0.12	581.46	584.37	587.12	593.17	334.54	252.45	249.31
0.14	583.13	585.88	588.64	594.47	330.93	261.66	258.09
0.16	584.30	587.04	590.13	595.40	328.46	268.91	265.00
0.18	586.63	589.40	592.34	597.43	330.61	279.93	275.51
0.20	588.63	591.40	594.16	599.24	329.28	287.70	282.93
0.22	590.63	593.41	596.12	601.08	329.80	294.76	289.67
0.24	592.63	595.43	598.23	602.95	328.52	300.89	295.53
0.26	594.96	597.60	600.42	605.15	328.38	305.70	300.14
0.28	597.12	599.95	602.61	607.30	329.52	310.73	304.96
0.30	599.36	602.29	604.97	609.52	328.77	314.66	308.73
0.32	601.97	604.64	607.33	612.07	327.95	316.71	310.72
0.34	604.13	606.98	609.64	614.27	328.66	319.69	313.58
0.36	606.80	609.50	612.21	616.92	329.88	321.46	315.31
0.38	609.30	612.01	614.73	619.45	329.71	323.18	316.99
0.40	611.80	614.52	617.26	622.00	328.10	324.18	317.98
0.42	614.47	617.04	619.78	624.69	328.75	324.46	318.28
0.44	616.97	619.72	622.31	627.30	329.06	325.76	319.56
0.46	619.24	622.23	624.40	629.71	328.83	326.06	319.89
0.48	622.30	624.91	627.53	632.70	329.85	327.04	320.86
0.50	624.97	627.43	630.23	635.38	329.51	327.27	321.13
0.52	627.80	630.44	632.92	638.36	329.20	327.48	321.37

Table contd ..,

0.54	630.64	633.29	635.78	641.27	330.88	328.14	322.04
0.56	633.64	636.13	638.64	644.30	330.19	327.67	321.64
0.58	636.97	639.32	641.84	647.67	329.90	327.26	321.30
0.60	640.30	642.67	645.04	651.10	328.87	326.87	320.99
0.62	643.80	646.18	648.57	654.70	328.59	327.17	321.33
0.64	647.39	650.04	652.28	658.49	327.66	327.97	322.15
0.66	651.36	654.05	656.15	662.60	327.35	327.03	321.32
0.68	654.98	658.39	660.51	666.51	328.99	331.83	325.94
0.70	659.09	663.25	665.22	670.93	327.88	332.83	326.96
0.72	664.00	668.45	670.27	676.12	327.17	330.83	325.14
0.74	669.03	674.15	675.84	681.41	328.40	330.64	325.04
0.76	674.98	680.36	681.91	687.63	328.27	329.38	323.94
0.78	681.25	686.90	688.31	694.17	327.87	328.39	323.09
0.80	687.91	693.94	695.22	701.10	327.61	327.65	322.50
0.82	695.60	701.31	702.29	709.04	328.61	327.33	322.32
0.84	704.32	709.01	712.67	717.58	328.80	335.04	329.78
0.86	712.32	717.23	719.78	726.16	329.25	332.55	327.55
0.88	719.16	725.44	728.13	733.25	328.48	332.85	327.94
0.90	728.83	735.16	738.13	743.40	326.49	330.18	325.56
0.92	739.00	745.21	749.06	753.90	324.27	327.81	323.47
0.94	752.05	757.95	761.19	767.78	322.92	326.15	322.11
0.96	769.20	774.69	777.48	785.75	319.50	321.66	318.12
0.98	778.99	783.77	789.13	795.45	317.20	323.15	319.69
					328.26±0.42	318.21±2.96	312.85±2.89

Table S3. Temperatures corresponding to the various degrees of conversion at different heating rates for AIOIPD (stage-III)

α	Heating Rates				E_a (kJ/mol)		
	10K/min	15K/min	20K/min	30K/min	Friedman method	KAS method	FWO method
0.12	897.64	901.62	905.56	913.95	443.18	431.84	424.90
0.14	907.48	911.51	915.40	924.00	442.28	435.58	428.62
0.16	916.15	920.23	924.33	932.90	441.35	437.93	430.99
0.18	924.16	928.28	932.41	941.17	440.25	438.43	431.60
0.20	931.67	935.82	939.82	948.94	439.69	438.09	431.40
0.22	938.67	942.70	946.91	956.13	438.67	437.90	431.32
0.24	945.45	949.40	953.48	963.11	438.92	436.98	430.56
0.26	951.68	955.77	959.80	969.58	439.59	437.72	431.37
0.28	957.69	961.81	965.94	975.80	438.73	437.99	431.71
0.30	963.53	967.68	971.84	981.84	439.68	438.21	432.02
0.32	969.20	973.38	977.57	987.71	439.41	438.29	432.19
0.34	974.87	978.91	983.13	993.51	440.58	437.89	431.90
0.36	980.21	984.44	988.52	999.09	439.80	438.36	432.43
0.38	985.55	989.80	993.91	1004.63	438.20	438.06	432.23
0.40	990.88	995.00	999.13	1010.09	439.59	437.44	431.73
0.42	995.89	1000.03	1004.19	1015.28	438.38	437.43	431.80
0.44	1000.90	1005.06	1009.25	1020.46	439.60	437.70	432.14
0.46	1005.91	1010.09	1014.13	1025.63	440.65	437.46	431.99
0.48	1010.77	1014.79	1019.02	1030.59	439.66	437.47	432.08
0.50	1015.41	1019.65	1023.73	1035.46	439.59	438.10	432.75
0.52	1020.08	1024.34	1028.34	1040.30	438.75	437.59	432.34

Table contd..,

0.54	1024.75	1028.87	1033.17	1045.08	439.30	438.07	432.87
0.56	1029.25	1033.39	1037.55	1049.74	439.17	437.42	432.33
0.58	1033.58	1037.75	1041.93	1054.23	438.95	437.57	432.54
0.60	1038.01	1042.28	1046.31	1058.84	439.61	437.48	432.53
0.62	1042.34	1046.47	1050.69	1063.27	439.01	437.46	432.57
0.64	1046.60	1050.66	1054.90	1067.65	438.85	437.03	432.24
0.66	1050.60	1054.68	1058.95	1071.79	439.52	437.35	432.60
0.68	1054.61	1058.71	1062.98	1075.94	439.78	437.52	432.83
0.70	1058.44	1062.73	1066.86	1079.96	440.56	438.16	433.50
0.72	1062.34	1066.59	1070.74	1083.98	439.75	437.94	433.35
0.74	1065.65	1070.42	1074.61	1087.58	440.99	441.43	436.73
0.76	1069.23	1074.29	1078.48	1091.40	440.88	442.53	437.84
0.78	1073.08	1078.15	1082.33	1095.42	439.89	441.73	437.13
0.80	1076.99	1082.17	1086.41	1099.54	439.03	441.67	437.14
0.82	1080.25	1086.21	1090.27	1103.17	438.77	444.29	439.68
0.84	1084.48	1090.22	1094.39	1107.55	437.40	442.24	437.80
0.86	1087.51	1094.24	1098.36	1110.96	438.71	446.14	441.56
0.88	1091.25	1098.26	1102.41	1114.97	439.13	445.74	441.24
0.90	1094.62	1102.29	1106.45	1118.65	439.18	446.76	442.27
0.92	1098.45	1106.31	1110.32	1122.74	439.56	445.36	441.00
0.94	1101.94	1110.17	1114.20	1126.50	437.08	444.87	440.59
0.96	1105.92	1114.02	1118.07	1130.69	436.69	443.05	438.92
0.98	1109.84	1117.87	1121.95	1134.84	433.24	441.11	437.14
					439.35±0.22	439.30±0.47	433.97±0.57

Table S4. Arrhenius parameters for nonisothermal decomposition of AIOIPD(stage-I)

Kinetic model	β = 10 K/min			β = 15 K/min			β = 20 K/min			β = 30 K/min		
	E_a (kJ/mol)	ln A (A/min)	r	E_a (kJ/mol)	ln A (A/min)	r	E_a (kJ/mol)	ln A (A/min)	r	E_a (kJ/mol)	ln A (A/min)	r
P2	26.51	3.53	-0.953	25.49	3.61	-0.949	25.95	3.99	-0.951	26.10	4.35	-0.952
P3	14.72	0.37	-0.933	14.02	0.53	-0.927	14.31	0.88	-0.930	14.38	1.26	-0.931
P4	8.85	-1.42	-0.900	8.32	-1.23	-0.889	8.53	-0.88	-0.894	8.56	-0.50	-0.895
F1	100.70	21.83	-0.994	97.71	21.37	-0.993	99.18	21.90	-0.994	99.77	22.21	-0.994
F2	156.12	35.40	-0.999	151.73	34.55	-0.998	153.91	35.19	-0.998	154.81	35.45	-0.999
F3	225.67	52.21	-0.994	219.53	50.86	-0.994	222.57	51.63	-0.994	223.88	51.83	-0.994
D1	143.56	38.29	-0.973	139.60	37.56	-0.971	141.64	38.19	-0.972	142.55	38.49	-0.973
D2	153.43	32.71	-0.979	148.97	31.85	-0.978	151.21	32.50	-0.979	152.15	32.78	-0.979
D3	180.68	37.86	-0.989	175.52	36.80	-0.987	178.12	37.51	-0.988	179.22	37.76	-0.989
D4	162.39	33.40	-0.983	157.70	32.47	-0.982	160.06	33.15	-0.983	161.05	33.41	-0.983
A2	45.95	8.71	-0.993	44.42	8.66	-0.991	45.14	9.07	-0.992	45.39	9.42	-0.992
A3	27.66	4.08	-0.991	26.63	4.16	-0.989	27.09	4.54	-0.990	27.23	4.90	-0.990
A4	18.57	1.64	-0.988	17.78	1.78	-0.986	18.12	2.14	-0.987	18.21	2.51	-0.988
R2	79.24	15.79	-0.983	76.80	15.49	-0.981	77.99	15.98	-0.983	78.46	16.30	-0.983
R3	73.24	14.56	-0.978	70.96	14.30	-0.976	72.08	14.78	-0.977	72.51	15.11	-0.978

Table S5. Arrhenius parameters for nonisothermal decomposition of AIOIPD (stage-II)

Kinetic model	β = 10 K/min			β = 15 K/min			β = 20 K/min			β = 30 K/min		
	E_a (kJ/mol)	ln A (A/min)	r	E_a (kJ/mol)	ln A (A/min)	r	E_a (kJ/mol)	ln A (A/min)	r	E_a (kJ/mol)	ln A (A/min)	r
P2	7.23	-2.83	-0.728	6.83	-2.57	-0.704	6.98	-2.25	-0.704	7.06	-1.84	-0.710
P3	1.21	-5.63	-0.253	0.92	-5.57	-0.193	1.01	-5.18	-0.206	1.03	-4.77	-0.212
P4	-1.78	-	0.447	-2.01	-	0.488	-1.96	-	0.470	-1.96	-	0.474
F1	46.01	6.41	-0.965	44.97	6.54	-0.961	45.59	6.92	-0.960	45.96	7.31	-0.962
F2	75.92	13.06	-0.993	74.47	13.09	-0.991	75.50	13.52	-0.991	76.04	13.90	-0.992
F3	113.60	21.17	-0.999	111.62	21.07	-0.998	113.17	21.57	-0.998	113.92	21.93	-0.999
D1	72.24	18.47	-0.938	70.87	18.53	-0.934	71.69	18.93	-0.933	72.32	19.35	-0.935
D2	72.39	10.29	-0.939	70.83	10.30	-0.934	71.72	10.71	-0.933	72.35	11.11	-0.935
D3	86.96	12.00	-0.958	85.19	11.96	-0.955	86.27	12.39	-0.954	86.99	12.79	-0.956
D4	77.18	9.85	-0.946	75.55	9.84	-0.942	76.51	10.26	-0.941	77.16	10.66	-0.943
A2	17.61	0.23	-0.940	17.06	0.47	-0.933	17.35	0.81	-0.931	17.49	1.20	-0.934
A3	8.13	-2.29	-0.881	7.73	-2.03	-0.865	7.91	-1.69	-0.863	7.98	-1.30	-0.869
A4	3.41	-4.02	-0.713	3.10	-3.79	-0.669	3.22	-3.45	-0.672	3.25	-3.05	-0.682
R2	34.51	3.04	-0.934	33.64	3.21	-0.928	34.11	3.57	-0.926	34.41	3.97	-0.929
R3	31.31	2.55	-0.920	30.49	2.73	-0.914	30.92	3.09	-0.912	31.19	3.49	-0.915

Table S6. Arrhenius parameters for nonisothermal decomposition of AIOIPD (stage-III)

Kinetic model	β = 10 K/min			β = 15 K/min			β = 20 K/min			β = 30 K/min		
	E_a (kJ/mol)	ln A (A/min)	r	E_a (kJ/mol)	ln A (A/min)	r	E_a (kJ/mol)	ln A (A/min)	r	E_a (kJ/mol)	ln A (A/min)	r
P2	21.26	-1.54	-0.992	21.06	-1.19	-0.990	21.29	-0.88	-0.990	21.00	-0.57	-0.991
P3	8.54	-3.84	-0.975	8.38	-3.49	-0.969	8.50	-3.18	-0.969	8.25	-2.87	-0.971
P4	2.21	-5.88	-0.821	2.07	-5.57	-0.772	2.15	-5.24	-0.781	1.91	-5.01	-0.765
F1	98.52	9.18	-0.995	98.26	9.49	-0.997	99.07	9.83	-0.997	98.47	10.01	-0.996
F2	153.46	16.62	-0.976	153.35	16.92	-0.979	154.58	17.28	-0.979	153.63	17.35	-0.977
F3	221.99	25.67	-0.957	222.09	25.97	-0.961	223.85	26.35	-0.961	222.44	26.28	-0.959
D1	153.63	23.59	-0.998	153.14	23.85	-0.997	154.33	24.21	-0.997	153.89	24.36	-0.998
D2	156.94	14.99	-0.999	156.40	15.24	-0.999	157.67	15.60	-0.999	156.98	15.69	-0.999
D3	184.34	17.17	-0.999	183.84	17.40	-0.999	185.32	17.78	-0.999	184.47	17.82	-0.999
D4	165.96	14.70	-1.000	165.44	14.95	-1.000	166.77	15.31	-1.000	166.03	15.39	-1.000
A2	40.84	1.63	-0.994	40.67	1.98	-0.995	41.04	2.29	-0.995	40.65	2.57	-0.994
A3	21.57	-1.24	-0.991	21.43	-0.88	-0.993	21.66	-0.57	-0.993	21.33	-0.27	-0.991
A4	12.00	-2.93	-0.984	11.87	-2.57	-0.989	12.02	-2.26	-0.989	11.73	-1.95	-0.985
R2	77.01	5.48	-0.999	76.71	5.80	-1.000	77.36	6.13	-1.000	76.89	6.35	-0.999
R3	70.96	4.90	-0.999	70.65	5.22	-0.999	71.26	5.54	-0.999	70.81	5.78	-0.999

Table S7. Compensation effect parameters for several combinations of kinetic model for AIOIPD (stage-I)

β (K/min)	AKM			AKM-{ F1; D1; D3; D4}			AKM –{ D2; A2; R2}		
	a_β A/min	b_β/mol/J	r	a_β A/min	b_β/mol/J	r	a_β A/min	b_β/mol/J	r
10	-2.818	0.240	0.992	-3.016	0.241	0.999	-3.081	0.244	0.999
15	-2.471	0.239	0.991	-2.670	0.240	0.999	-2.690	0.244	0.999
20	-2.171	0.238	0.991	-2.370	0.239	0.999	-2.465	0.243	0.999
30	-1.782	0.236	0.991	-1.980	0.237	0.999	-2.075	0.241	0.999
β (K/min)	AKM-{ P4}			AKM-{ R3}					
	a_β A/min	b_β/mol/J	r	a_β A/min	b_β/mol/J	r			
10	-2.928	0.244	0.999	-2.928	0.244	0.999			
15	-2.633	0.243	0.999	-2.577	0.243	0.999			
20	-2.336	0.242	0.999	-2.279	0.242	0.999			
30	-1.946	0.240	0.999	-1.889	0.240	0.999			

Table S8. Compensation effect parameters for several combinations of kinetic model for AIOIPD (stage-II)

β (K/min)	AKM-{D1 }			AKM –{F3}			AKM-{ F2 ; D3 ; A4 ; R3}		
	a_β A/min	b_β/mol/J	r	a_β A/min	b_β/mol/J	r	a_β A/min	b_β/mol/J	r
10	-4.492	0.212	0.988	-4.164	0.207	0.988	-4.122	0.209	0.990
15	-4.193	0.212	0.987	-3.825	0.207	0.987	-3.770	0.209	0.989
20	-3.876	0.211	0.988	-3.520	0.206	0.988	-3.470	0.208	0.989
30	-3.477	0.209	0.988	-3.123	0.205	0.988	-3.073	0.206	0.989

β (K/min)	AKM-{F1}		
	a_β A/min	b_β/mol/J	r
10	-4.026	0.208	0.987
15	-3.672	0.207	0.987
20	-3.370	0.206	0.987
30	-2.978	0.205	0.987

Table S9. Compensation effect parameters for several combinations of kinetic model for AIOIPD (stage-III)

β (K/min)	AKM			AKM-{P3 ; P4 ; D1 ; D2 ; D3 }			AKM-{ P2 ; R3}		
	a_β A/min	b_β/mol/J	r	a_β A/min	b_β/mol/J	r	a_β A/min	b_β/mol/J	r
10	-4.610	0.135	0.972	-4.390	0.135	0.999	-4.317	0.135	0.999
15	-4.234	0.134	0.972	-4.001	0.135	0.999	-3.928	0.134	0.999
20	-3.936	0.134	0.972	-3.708	0.134	0.999	-3.634	0.134	0.999
30	-3.588	0.133	0.971	-3.337	0.133	0.999	-3.265	0.133	0.999

β (K/min)	AKM-{ A4 ; R2}		
	a_β A/min	b_β/mol/J	r
10	-3.982	0.133	0.999
15	-3.591	0.133	0.999
20	-3.299	0.132	0.999
30	-2.926	0.131	0.999

Table S10. IKP for several combinations of kinetic models for AIOIPD**.**

Stage	Kinetic model	E_{inv} *(kJ/mol)*	*ln* A_{inv}	*-r*
Stage-1	AKM	231.53	53	0.984
	AKM-{ F1; D1; D3; D4}	262.07	60.38	0.993
	AKM –{ D2; A2; R2}	235.67	54.79	0.957
	AKM-{ P4}	222.1	51.45	0.992
	AKM-{ R3}	229.02	53.18	0.982
Stage-2	AKM-{D1 }	280.97	55.46	0.886
	AKM –{F3}	306.82	59.82	0.947
	AKM-{ F2 ; D3 ; A4 ; R3}	308.05	60.52	0.957
	AKM-{F1}	311.18	60.88	0.963
Stage-3	AKM	476.12	59.81	0.975
	AKM-{P3 ; P4 ; D1 ; D2 ; D3 }	446.80	56.28	0.977
	AKM-{ P2 ; R3}	448.69	56.50	0.977
	AKM-{ A4 ; R2}	445.2	55.69	0.978

Table S11. Kinetic and thermodynamic parameters for the thermal behavior of AIOIPD in nitrogen atmosphere.

Kissinger Method	Peak Temperature (K)	E_a (kJ/mol)	ln A (A/min)	$\Delta G^{\neq}$ (kJ/mol)	$\Delta H^{\neq}$ (kJ/mol)	$\Delta S^{\neq}$ (J/mol)	-r
Stage-1	506.01 509.92 512.73 514.14	186.51	44.13	126.57	182.27	109.24	0.984
Stage-2	653.59 655.79 656.97 658.26	558.94	103.10	161.68	553.48	597.44	0.962
Stage-3	980.45 985.10 987.19 989.98	615.26	75.08	251.37	607.07	361.08	0.957

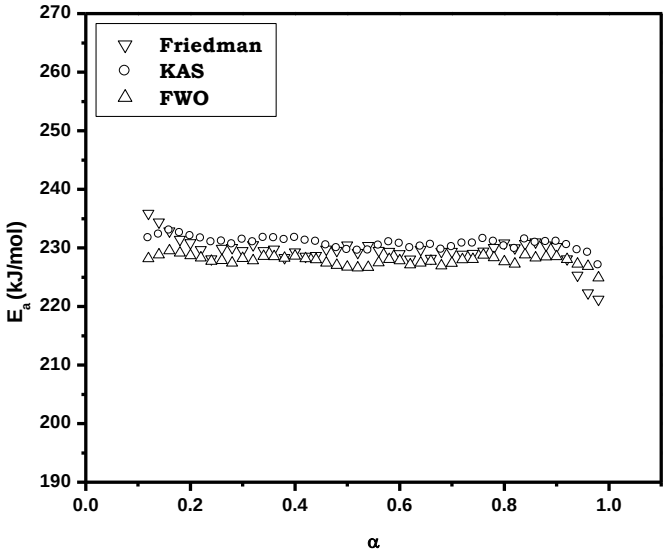

Figure S1: *E_a versus* α plot for the decomposition of AIOIPD under non-isothermal condition (stage I)

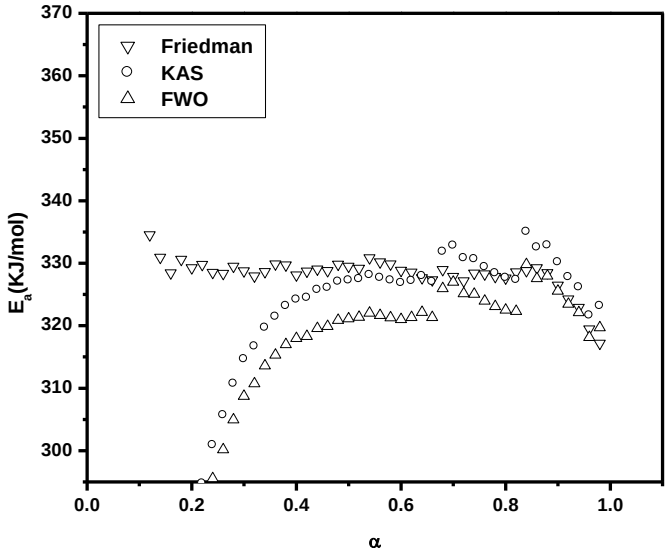

Figure S2: *E_a versus* α plot for the decomposition of AIOIPD under non-isothermal condition (stage II)

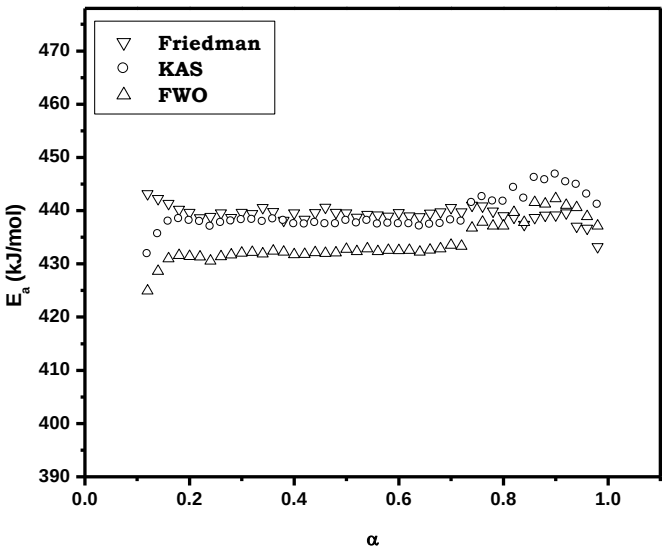

Figure S3: *E_a versus* α plot for the decomposition of AIOIPD under non-isothermal condition (stage III)

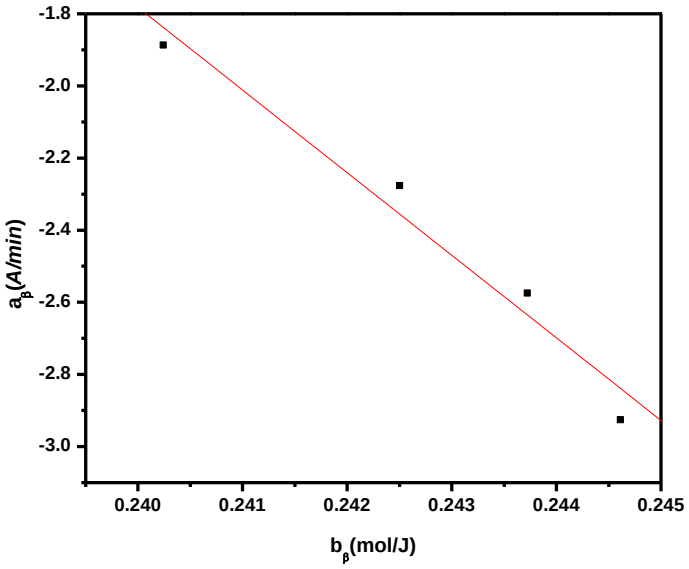

Figure S4: Supercorrelation (Compensation effect parameters) plot for the best combination of kinetic models (Stage I)

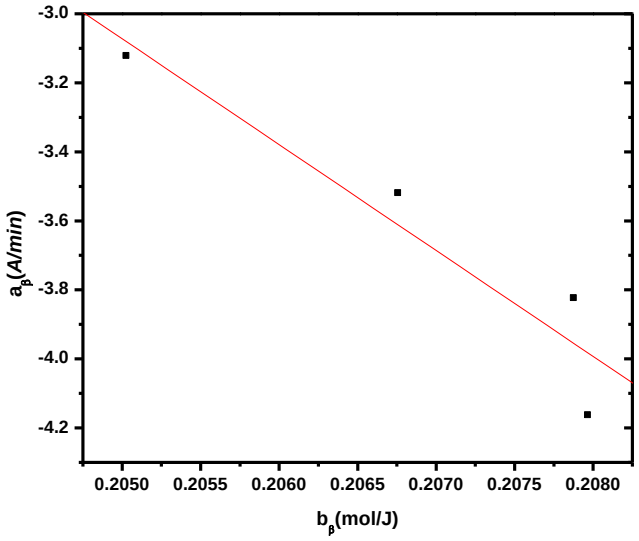

Figure S5: Supercorrelation (Compensation effect parameters) plot for the best combination of kinetic models (Stage II)

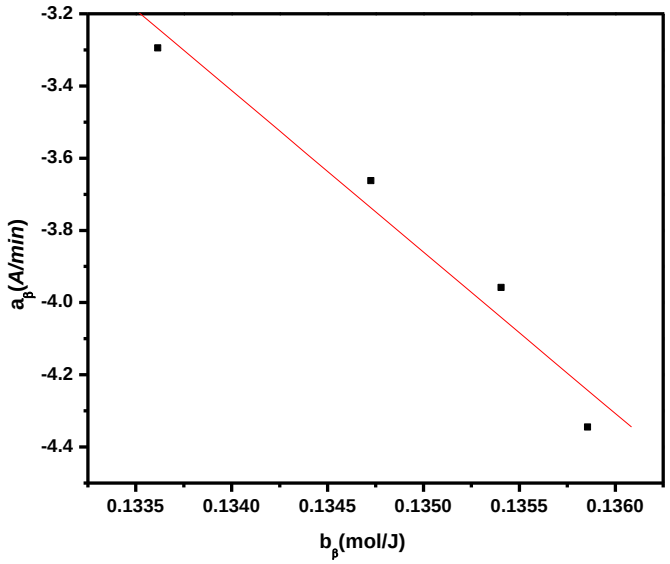

Figure S6: Supercorrelation (Compensation effect parameters) plot for the best combination of kinetic models (Stage III)