

**Appendix F1: Statistical analysis for calibration data using paraffin wax flakes**

Temp. [°C]	Heat flow, J/g					
	R1	R2	R3	Average	STDE	% differences
64.538	1.914201	1.81591	1.827395	1.85250	0.0537	2.9010
63.6537	3.262726	3.119709	3.124393	3.16894	0.0813	2.5640
62.7533	3.795004	3.63778	3.636257	3.68968	0.0912	2.4722
61.8525	4.290441	4.131589	4.121991	4.18134	0.0946	2.2626
60.9517	4.775411	4.618065	4.597249	4.66358	0.0974	2.0887
60.0509	5.254571	5.10156	5.078527	5.14489	0.0957	1.8598
59.1502	5.728616	5.584937	5.546616	5.62006	0.0959	1.7072
58.2495	6.196001	6.036036	6.004327	6.07879	0.1027	1.6901
57.349	6.671287	6.5197	6.479776	6.55692	0.1010	1.5409
56.4957	14.09183	14.24285	16.21024	14.84831	1.1819	7.9597
55.8588	56.89146	56.69376	53.69657	55.76060	1.7902	3.2106
55.0524	76.87194	78.42899	78.47556	77.92550	0.9127	1.1712
54.1836	87.71903	89.83565	89.63226	89.06232	1.1678	1.3112
53.2666	90.02632	92.00775	91.75841	91.26416	1.0792	1.1825
52.3121	84.32042	85.84362	85.72996	85.29800	0.8485	0.9948
51.3374	73.02092	73.95953	73.93265	73.63770	0.5343	0.7256
50.363	60.04396	60.54022	60.56413	60.38277	0.2937	0.4863
49.4029	48.75466	48.94806	49.00303	48.90192	0.1305	0.2668
48.46	40.3962	40.46543	40.46404	40.44189	0.0396	0.0979
47.531	34.68136	34.62309	34.56059	34.62168	0.0604	0.1745
46.6111	30.778	30.66627	30.57374	30.67267	0.1023	0.3335
45.697	28.09647	28.00098	27.90442	28.00062	0.0960	0.3429
44.7869	26.25773	26.19909	26.05363	26.17015	0.1051	0.4015
43.88	25.20293	25.09714	25.05755	25.11920	0.0752	0.2992
42.9796	26.07204	26.02232	25.87054	25.98830	0.1050	0.4039
42.0842	28.69387	28.27553	28.04894	28.33944	0.3272	1.1545
41.1934	33.04811	32.36512	31.98431	32.46585	0.5390	1.6602
40.3053	38.64864	37.96052	37.50333	38.03750	0.5765	1.5157
39.4145	43.56082	43.48281	43.11849	43.38737	0.2361	0.5442
38.5143	45.01604	45.58762	45.51159	45.37175	0.3104	0.6841
37.6096	44.67219	45.42752	45.38799	45.16257	0.4251	0.9414
36.7031	43.43009	44.24604	44.19698	43.95770	0.4576	1.0410
35.7953	41.50016	42.18704	42.25143	41.97954	0.4164	0.9919
34.8867	38.96442	39.65405	39.6763	39.43159	0.4047	1.0264
33.9788	36.51178	37.05811	37.04551	36.87180	0.3119	0.8458
33.0721	34.47759	34.84126	34.83371	34.71752	0.2078	0.5986
32.1663	32.66607	32.89928	33.01273	32.85936	0.1767	0.5379
31.2612	31.06246	31.21214	31.27838	31.18433	0.1106	0.3547
30.3567	29.62008	29.7161	29.77566	29.70395	0.0785	0.2643
29.4529	28.41051	28.40911	28.46428	28.42797	0.0315	0.1107
28.5496	27.36356	27.25156	27.25084	27.28865	0.0649	0.2377
27.6465	26.3822	26.23563	26.20841	26.27541	0.0935	0.3558
26.7438	25.52885	25.33865	25.29911	25.38887	0.1228	0.4838
25.8415	24.83621	24.52035	24.48043	24.61233	0.1949	0.7919
24.9399	24.49227	23.84159	23.82811	24.05399	0.3796	1.5782
24.0392	24.68741	24.41053	23.2963	24.13141	0.7364	3.0515

23.1376	24.32591	24.57749	23.97383	24.29241	0.3032	1.2482
22.2351	23.27612	23.67054	23.66921	23.53863	0.2273	0.9658
21.3337	22.91363	23.12947	23.43059	23.15790	0.2596	1.1212
20.4326	22.69522	22.86918	22.89751	22.82064	0.1095	0.4800
19.5317	22.57446	22.80302	22.71892	22.69880	0.1156	0.5093
18.6308	22.50444	22.67265	22.62518	22.60076	0.0867	0.3837
17.73	22.45153	22.61437	22.57115	22.54568	0.0844	0.3741
16.8293	22.4233	22.53129	22.56691	22.50717	0.0748	0.3323
15.9286	22.41525	22.53793	22.54152	22.49823	0.0719	0.3195
15.0281	22.47577	22.5846	22.5656	22.54199	0.0581	0.2579
14.1276	22.56468	22.63103	22.63357	22.60976	0.0391	0.1728
13.2271	22.70154	22.69658	22.6343	22.67748	0.0375	0.1652
12.3268	22.8976	22.76418	22.70976	22.79051	0.0966	0.4241
11.4263	22.97196	22.80243	22.7662	22.84686	0.1098	0.4808
10.5258	23.03146	22.83455	22.93041	22.93214	0.0985	0.4294
9.62528	23.06845	22.93502	23.02707	23.01018	0.0683	0.2968
8.72491	23.21114	22.95694	23.05018	23.07275	0.1286	0.5574
7.82456	23.36571	23.06812	23.14665	23.19349	0.1542	0.6650
6.92418	23.48969	23.16477	23.24181	23.29876	0.1698	0.7287
6.02381	23.60552	23.22729	23.31843	23.38375	0.1974	0.8441
5.12348	23.76467	23.26452	23.35537	23.46152	0.2664	1.1356
4.22307	23.82114	23.34044	23.4662	23.54259	0.2493	1.0589
3.32267	23.886	23.42571	23.59455	23.63542	0.2329	0.9852
2.42222	23.88249	23.47134	23.64309	23.66564	0.2065	0.8726
1.52186	23.96655	23.49989	23.7569	23.74111	0.2337	0.9845
0.62148	24.01671	23.56131	23.77004	23.78269	0.2280	0.9585
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0.27893	24.02262	23.6052	23.86643	23.83142	0.2109	0.8850
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1.17922	24.15355	23.60973	23.95835	23.90721	0.2755	1.1523
-						
2.07954	24.2465	23.69222	24.00901	23.98258	0.2781	1.1595
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2.97992	24.25258	23.70298	24.04648	24.00068	0.2776	1.1568
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3.88028	24.28213	23.72099	24.11424	24.03912	0.2880	1.1981
-						
4.78058	24.37189	23.82555	24.19855	24.13200	0.2792	1.1569
-						
5.68088	24.44307	23.87177	24.17702	24.16395	0.2859	1.1831
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6.58119	24.50765	23.92366	24.25433	24.22855	0.2928	1.2087
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7.48149	24.57113	23.96051	24.3689	24.30018	0.3111	1.2801
-						
8.38178	24.63268	24.02841	24.38202	24.34770	0.3036	1.2469
-9.2822	24.51195	24.05582	24.43222	24.33333	0.2436	1.0012
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10.1826	24.35316	24.04377	24.38953	24.26215	0.1900	0.7831
-						
11.0829	24.32795	23.99387	24.39871	24.24018	0.2162	0.8920
-						
11.9833	24.27639	24.02012	24.48401	24.26017	0.2324	0.9578
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12.8835	24.28873	23.92766	24.50034	24.23891	0.2896	1.1947

-	13.7838	24.30603	23.86362	24.54177	24.23714	0.3443	1.4205
-	14.6842	24.25085	23.9229	24.71249	24.29541	0.3967	1.6327
-	15.5844	24.36772	23.93782	24.58715	24.29756	0.3303	1.3594
-	16.4846	24.35297	23.78275	24.61048	24.24873	0.4236	1.7469
-	-17.385	24.20059	23.68956	24.58561	24.15859	0.4495	1.8606
-	18.2853	24.14001	23.5926	24.49926	24.07729	0.4566	1.8963
-	19.1857	23.95636	23.35252	24.34496	23.88461	0.5001	2.0938

**Appendix F2: Wax appearance temperatures (WAT1&WAT2) and wax content (WC1&WC2) results for Abu and Abu treated with chemicals**

<b>WAT 1</b>					
cooling rate	Abu un	PPD2000	PPD1000	ROA1000	ROA500
0.5	68.9	66.8	64.0	63.2	62.1
1	68.1	65.7	63.3	62.9	61.6
5	68.0	66.0	63.7	63.5	62.4
15	66.0	64.1	60.3	60.8	60.2
<b>WAT 2</b>					
cooling rate	Abu un	PPD2000	PPD1000	ROA1000	ROA500
0.5	40.58	39.94	39.48	39.96	38.18
1	39.16	39.29	39.66	39.75	38.38
5	39.08	39.22	39.29	40.07	38.26
15	39.4	38.64	38.21	39.43	37.97

<b>WC1</b>					
cooling rate	Abu un	PPD2000	PPD1000	ROA1000	ROA500
0.5	0.70	0.88	0.823	0.74	0.82
1	0.76	0.96	0.82	0.84	0.86
5	0.95	1.43	1.24	1.13	1.19
15	1.54	1.26	0.95	1.08	1.04
<b>WC2</b>					
cooling rate	Abu un	PPD2000	PPD1000	ROA1000	ROA500
0.5	30.88	32.49	29.67	29.87	26.48
1	27.99	29.64	29.74	29.55	27.31
5	28.36	28.45	28.42	29.75	27.88
15	29.10	27.54	27.18	29.68	26.64

**Appendix F3:** Statistical analysis data for Wax appearance temperatures results; (WAT1) & (WAT2) for Abu and Abu treated with chemicals.

WAT1						
Abu-attifel untreated	R1	R2	R3	Ave.	STD	% difference
1	68.14	68.2	67.99	68.1100	0.1082	0.1588
5	67.99	68.23	67.79	68.0033	0.2203	0.3240
15	65.96	66.24	65.69	65.9633	0.2750	0.4169
Abu+ROA500	R1	R2	R3	Ave.	STD	%difference
1	61.61	61.74	61.46	61.6033	0.1401	0.2275
5	62.38	62.6	62.18	62.3867	0.2101	0.3367
15	60.24	60.53	59.97	60.2467	0.2801	0.4649
Abu+ROA1000	R1	R2	R3	Ave.	STD	%difference
1	62.9	63.1	62.75	62.9167	0.1756	0.2791
5	63.46	63.64	63.26	63.4533	0.1901	0.2996
15	60.84	61.15	60.57	60.8533	0.2902	0.4769
Abu+PPD1000	R1	R2	R3	Ave.	STD	%difference
1	63.3	63.43	63.15	63.2933	0.1401	0.2214
5	63.73	63.9	63.53	63.7200	0.1852	0.2907
15	60.3	60.54	60.03	60.2900	0.2551	0.4232
Abu+PPD2000	R1	R2	R3	Ave.	STD	%difference
1	65.73	65.9	65.58	65.7367	0.1601	0.2436
5	66.02	66.18	65.82	66.0067	0.1804	0.2733
15	64.13	64.5	63.86	64.1633	0.3213	0.5008

WAT2						
Abu-attifel untreated	R1	R2	R3	Ave.	STD	%difference
1	39.16	39.35	39.01	39.17333	0.170392	0.4350
5	39.08	39.3	38.88	39.08667	0.210079	0.5375
15	39.4	39.1	39.13	39.21	0.165227	0.4214
Abu+ROA500	R1	R2	R3	Ave.	STD	%difference
1	38.38	38.6	38.23	38.40333	0.1861	0.4846
5	38.26	38.15	38.06	38.15667	0.100167	0.2625
15	37.97	38.23	37.7	37.96667	0.265016	0.6980
Abu+ROA1000	R1	R2	R3	Ave.	STD	%difference
1	39.75	39.95	39.6	39.76667	0.175594	0.4416
5	40.07	40.15	39.87	40.03	0.144222	0.3603
15	39.43	39.75	39.16	39.44667	0.295353	0.7487
Abu+PPD1000	R1	R2	R3	Ave.	STD	%difference
1	39.66	39.85	39.51	39.67333	0.170392	0.4295
5	39.29	39.52	39.09	39.3	0.215174	0.5475
15	38.21	38.41	37.94	38.18667	0.235867	0.6177
Abu+PPD2000	R1	R2	R3	Ave.	STD	%difference
1	39.29	39.46	39.14	39.29667	0.160104	0.4074
5	39.22	39.34	39.02	39.19333	0.161658	0.4125
15	38.64	38.51	37.97	38.37333	0.355293	0.9259