ภาคผนวก ก.

ผลการวิเคราะห์พื้นผิวถ่านตัวอย่างที่ไม่ผ่านการออกซิไดส์ โดย BET Analysis

micromeritics®

Sample: Green grass
Operator:
Submitter:
File: D:\SEC\Data from Surface ana...\Green grass port 3.SMP

Started:	03-Mar-17 9:08:52 PM	Analysis adsorptive:	N2
Completed:	05-Mar-17 5:25:47 AM	Analysis bath temp.:	77.100 K
Report time:	08-Mar-17 2:54:14 PM	Thermal correction:	No
Sample mass:	0.1928 g	Warm free space:	18.5799 cm³ Measured
Cold free space:	63.1278 cm³	Equilibration interval:	10 s
Low pressure dose:	None	Sample density:	1.000 g/cm³
Automatic degas:	No		

Summary Report

Surface Area

Single point surface area at p/p° = 0.299581838:	220.4063 m²/g
BET Surface Area:	218.0418 m²/g
Langmuir Surface Area:	337.1899 m²/g
t-Plot Micropore Area:	158.2671 m²/g
t-Plot external surface area:	59.7747 m²/g
BJH Adsorption cumulative surface area of pores between 17.000 Å and 3,000.000 Å width:	35.6699 m²/g
BJH Desorption cumulative surface area of pores between 17.000 Å and 3,000.000 Å width:	12.5965 m²/g
D-H Adsorption cumulative surface area of pores between 17.000 Å and 3,000.000 Å width:	35.4532 m²/g
D-H Desorption cumulative surface area of pores between 17.000 Å and 3,000.000 Å width:	12.3859 m²/g

Pore Volume

Single point adsorption total pore volume of pores less than 403.122 Å width at p/p° = 0.950000000:	0.119034 cm³/g
Single point desorption total pore volume of pores less than 403.122 Å width at p/p° = 0.950000000:	0.121283 cm³/g
t-Plot micropore volume:	0.082294 cm³/g

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Automatic degas:	No		

Pore Volume

BJH Adsorption cumulative volume of pores between 17.000 Å and 3,000.000 Å width:	0.028527 cm³/g
BJH Desorption cumulative volume of pores between 17.000 Å and 3,000.000 Å width:	0.007776 cm³/g
D-H Adsorption cumulative volume of pores between 17.000 Å and 3,000.000 Å width:	0.028336 cm³/g
D-H Desorption cumulative volume of pores between 17.000 Å and 3,000.000 Å width:	0.008265 cm³/g

Pore Size

Adsorption average pore diameter (4V/A by BET):	21.837 Å
Desorption average pore diameter (4V/A by BET):	22.250 Å
BJH Adsorption average pore width (4V/A):	31.990 Å
BJH Desorption average pore width (4V/A):	24.693 Å
D-H Adsorption average pore width (4V/A):	31.970 Å
D-H Desorption average pore width (4V/A):	26.693 Å

Freundlich

Qm·C: 0.11158 ± 0.0112 mmol/g

m: 13.8847 ± 0.3843

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Temkin

q·alpha/Qm: 2.975366 ± 0.065562 kJ/mol·(mmol/g)

A: 93905.4213 ± 26015.3735 kPa

Nanoparticle Size:

Average Particle Size 275.177 Å

Horvath-Kawazoe

Maximum pore volume at p/p° = 0.174989307: 0.107588 cm³/g

Median pore width: 7.681 Å

Dubinin-Astakhov

Micropore surface area: 302.4094 m²/g

Limiting micropore volume: 0.136202 cm³/g

MP-Method

Cumulative surface area of pores between 3.1033 Å and 19.2000 Å hydraulic radius: 309.2966 m²/g

Cumulative pore volume of pores between 3.1033 Å and 19.2000 Å hydraulic radius: 0.114089 cm³/g

Average pore hydraulic radius (V/A): 3.6887 Å

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Isotherm Reports

Primary Data
Analysis temperature was adjusted by as much as 0.149 K to find usable compressibility factors.

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Automatic degas:	No		

Isotherm Tabular Report

Relative Pressure (p/p°)	Absolute Pressure (kPa)	Quantity Adsorbed (mmol/g)	Elapsed Time (h:min)	Saturation Pressure (kPa)
			01:09	101.3236244
0.009627203	0.9739435	2.36771	14:40	101.1657760
0.014768381	1.4915545	2.46528	16:09	100.9964784
0.020973370	2.1175789	2.49965	16:24	100.9651251
0.027480821	2.7744704	2.51267	16:27	100.9602427
0.031686371	3.1979754	2.55514	16:46	100.9258949
0.038135126	3.8467162	2.81597	21:49	100.8706830
0.043596000	4.3987222	2.84710	22:21	100.8973817
0.054658805	5.5168846	2.87968	22:41	100.9331372
0.059731495	6.0309441	2.89923	22:57	100.9675745
0.064838421	6.5473838	2.91794	23:11	100.9800002
0.070028438	7.0721948	2.93419	23:24	100.9903265
0.075147425	7.5894101	2.94688	23:33	100.9936140
0.080220217	8.1018935	2.95945	23:41	100.9956565
0.085151172	8.6002387	2.97180	23:50	100.9996519
0.090095167	9.1000797	2.98175	23:56	101.0051935
0.095317003	9.6282794	2.99178	24:02	101.0132413
0.100108935	10.1124265	3.00118	24:08	101.0142259
0.105258222	10.6326618	3.00948	24:13	101.0150234
0.109989550	11.1107384	3.01870	24:18	101.0163091
0.115130705	11.6302962	3.02615	24:22	101.0181969
0.120144222	12.1369726	3.03379	24:27	101.0200279
0.125063734	12.6345474	3.04114	24:31	101.0248696
0.130137765	13.1471020	3.04794	24:34	101.0244953
0.134935884	13.6313640	3.05425	24:37	101.0210450
0.139912977	14.1348770	3.06042	24:41	101.0262041
0.144954635	14.6445551	3.06674	24:44	101.0285395
0.149828479	15.1369219	3.07288	24:47	101.0283361
0.154819984	15.6419688	3.07855	24:50	101.0332673
0.159805680	16.1453272	3.08381	24:52	101.0309970

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0.165134078	16.6840179	3.08921	24:55	101.0331615
0.170028158	17.1785778	3.09484	24:58	101.0337230
0.174989307	17.6803779	3.10027	25:00	101.0369047
0.180016781	18.1882505	3.10555	25:03	101.0364165
0.184968134	18.6860836	3.11113	25:06	101.0232584
0.189977538	19.1936897	3.11651	25:08	101.0313632
0.195000552	19.7006305	3.12187	25:11	101.0285883
0.199647149	20.1717284	3.12701	25:14	101.0368966
0.204857433	20.6980076	3.13226	25:16	101.0361561
0.209933129	21.2101360	3.13769	25:19	101.0328198
0.214939002	21.7152236	3.14291	25:21	101.0297032
0.219880274	22.2133456	3.14820	25:24	101.0247312
0.224880764	22.7191025	3.15331	25:27	101.0273271
0.229641896	23.1993426	3.15834	25:29	101.0239989
0.235085727	23.7493748	3.16336	25:32	101.0243162
0.239931240	24.2401976	3.16833	25:35	101.0297683
0.244943834	24.7459830	3.17330	25:37	101.0271724
0.249737507	25.2309306	3.17809	25:40	101.0298008
0.255000496	25.7637034	3.18289	25:43	101.0339346
0.259910538	26.2599091	3.18785	25:45	101.0344147
0.264790263	26.7535067	3.19273	25:48	101.0365955
0.269884027	27.2677285	3.19759	25:50	101.0349843
0.274963055	27.7814518	3.20234	25:53	101.0370349
0.279523386	28.2435151	3.20698	25:56	101.0416895
0.284543863	28.7495446	3.21160	25:58	101.0373035
0.289664255	29.2682765	3.21631	26:01	101.0420719
0.294509818	29.7582489	3.22081	26:04	101.0433170
0.299581838	30.2695432	3.22551	26:06	101.0393134
0.324542423	32.7921879	3.23232	26:09	101.0412989
0.356884964	36.0581107	3.24062	26:12	101.0356678

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0.374935700	37.8821107	3.24802	26:14	101.0362863
0.400160657	40.4313198	3.25586	26:17	101.0377185
0.424931045	42.9337106	3.26350	26:20	101.0368884
0.449770452	45.4446660	3.27138	26:22	101.0396877
0.475044613	47.9958931	3.27893	26:25	101.0344961
0.499460412	50.4620035	3.28632	26:27	101.0330395
0.524527428	52.9925089	3.29368	26:30	101.0290522
0.549990009	55.5669072	3.30108	26:33	101.0325757
0.574307687	58.0246727	3.30825	26:35	101.0341217
0.599630900	60.5807660	3.31520	26:38	101.0300938
0.625092179	63.1557258	3.32257	26:41	101.0342601
0.650114603	65.6851651	3.32967	26:43	101.0362863
0.675016540	68.2020323	3.33699	26:46	101.0375720
0.699355722	70.6613521	3.34383	26:49	101.0377836
0.724454559	73.1990102	3.35083	26:51	101.0401678
0.749539677	75.7269849	3.35768	26:54	101.0313225
0.774569371	78.2564487	3.36479	26:57	101.0322013
0.800010826	80.8182422	3.37235	26:59	101.0214356
0.824831753	83.3301781	3.37977	27:02	101.0268795
0.849752836	85.8439775	3.38764	27:05	101.0222900
0.874366395	88.3293287	3.39588	27:07	101.0209555
0.899940377	90.9149239	3.40522	27:10	101.0232747
0.924929645	93.4374872	3.41620	27:13	101.0211834
0.950048735	95.9708651	3.43013	27:15	101.0167810
0.974694105	98.4644187	3.45657	27:18	101.0208416
0.990780047	100.0660615	3.53228	27:41	100.9972514
0.968757075	97.8427005	3.50386	27:44	100.9981791
0.952965716	96.2466156	3.49559	27:47	100.9969340
0.937776411	94.7110237	3.49272	27:50	100.9953147
0.922427975	93.1600930	3.49157	27:53	100.9944359

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0.907506203	91.6486610	3.49149	27:56	100.9895697
0.892613901	90.1457324	3.49224	27:58	100.9907334
0.877542999	88.6263746	3.49353	28:01	100.9937686
0.862428295	87.0966905	3.49478	28:04	100.9900661
0.847645211	85.6001661	3.49647	28:07	100.9858428
0.832401520	84.0647451	3.49814	28:10	100.9906195
0.817372605	82.5415383	3.49982	28:12	100.9839794
0.802579736	81.0468204	3.50197	28:15	100.9828890
0.767244536	77.4759788	3.50320	28:18	100.9795120
0.742863663	75.0173832	3.50445	28:21	100.9840526
0.717312203	72.4357915	3.50556	28:24	100.9822380
0.692948395	69.9739573	3.50658	28:26	100.9800409
0.667648395	67.4226610	3.50756	28:29	100.9852814
0.642456102	64.8811458	3.50839	28:32	100.9892280
0.617424070	62.3496029	3.50912	28:35	100.9834342
0.592325234	59.8144145	3.50949	28:37	100.9823845
0.567964132	57.3572470	3.50991	28:40	100.9874459
0.542474729	54.7835567	3.50969	28:43	100.9882189
0.517457933	52.2586498	3.50961	28:46	100.9911077
0.492336921	49.7221879	3.50867	28:49	100.9921981
0.468010366	47.2646339	3.50672	28:51	100.9905706
0.442796774	44.7147210	3.50460	28:54	100.9824902
0.417897774	42.1999532	3.50263	28:57	100.9815219
0.392401914	39.6242855	3.50028	29:00	100.9788284
0.367335982	37.0924009	3.49764	29:03	100.9767697
0.342766106	34.6118548	3.49420	29:05	100.9780554
0.317603784	32.0716741	3.49068	29:08	100.9801385
0.292553723	29.5429773	3.48620	29:11	100.9830843
0.277392811	28.0111510	3.48236	29:14	100.9800897
0.262355871	26.4932680	3.47880	29:16	100.9821810

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0.247542890	24.9978178	3.47507	29:19	100.9837841
0.232483188	23.4769810	3.47092	29:22	100.9835644
0.217398180	21.9546001	3.46639	29:25	100.9879667
0.202598252	20.4590705	3.46175	29:27	100.9834504
0.187436111	18.9284974	3.45632	29:30	100.9863962
0.172532015	17.4233962	3.45039	29:33	100.9864531
0.157582324	15.9154073	3.44344	29:36	100.9974141
0.142590313	14.4005962	3.43524	29:40	100.9928084
0.127542250	12.8808407	3.42555	29:44	100.9927352
0.112656969	11.3776802	3.41416	29:48	100.9940209
0.102604950	10.3625800	3.40469	29:53	100.9949323
0.087744284	8.8615973	3.39069	29:59	100.9934431
0.077675597	7.8451747	3.37772	30:06	100.9992206
0.067749053	6.8432498	3.36391	30:14	101.0087902
0.057953418	5.8539028	3.34787	30:24	101.0104827
0.049176354	4.9670955	3.33099	30:35	101.0057712
0.023725833	2.3966563	3.25448	31:11	101.0146328
0.012828077	1.2959038	3.18500	32:04	101.0208904

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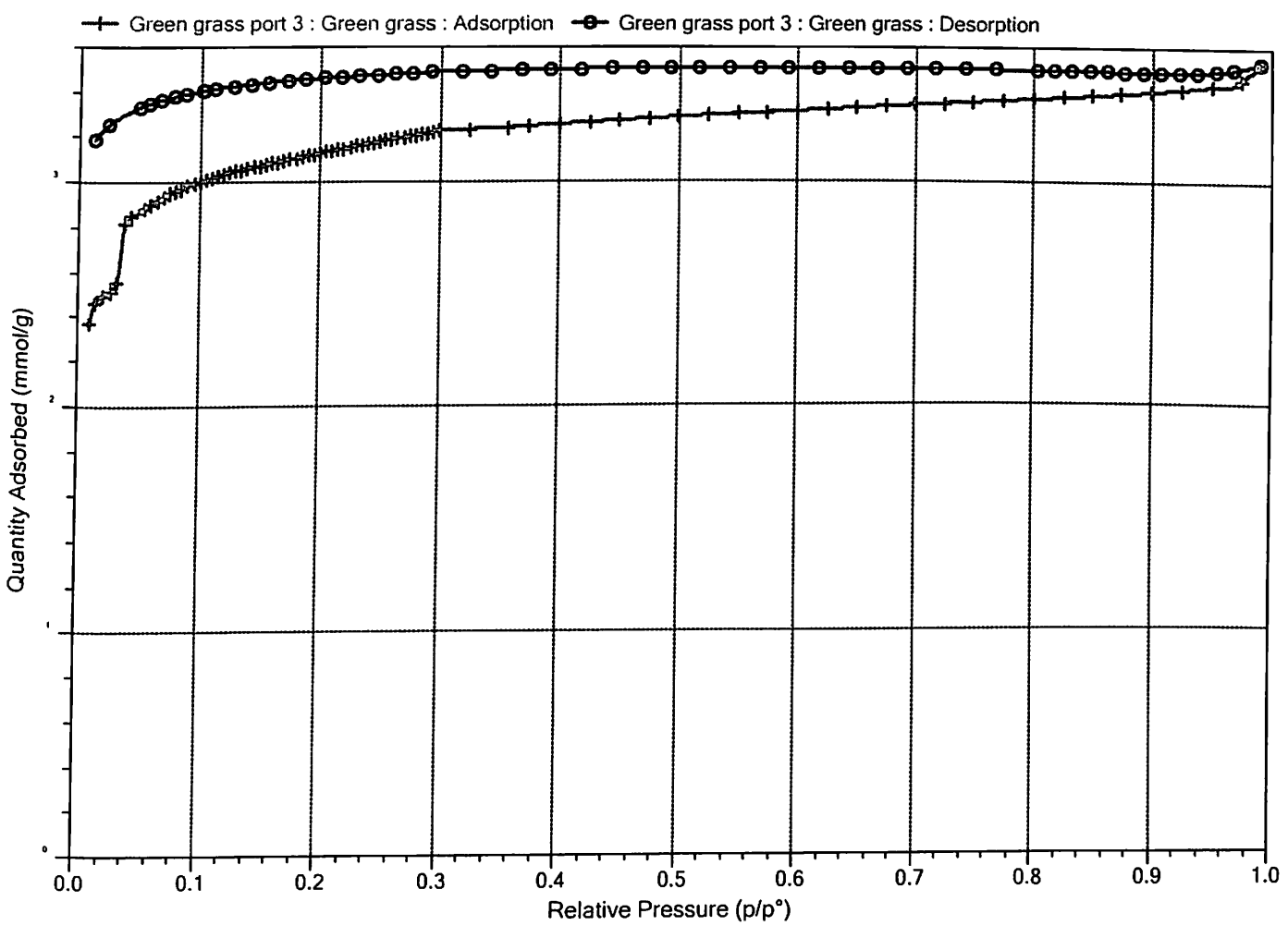
Isotherm Linear Plot



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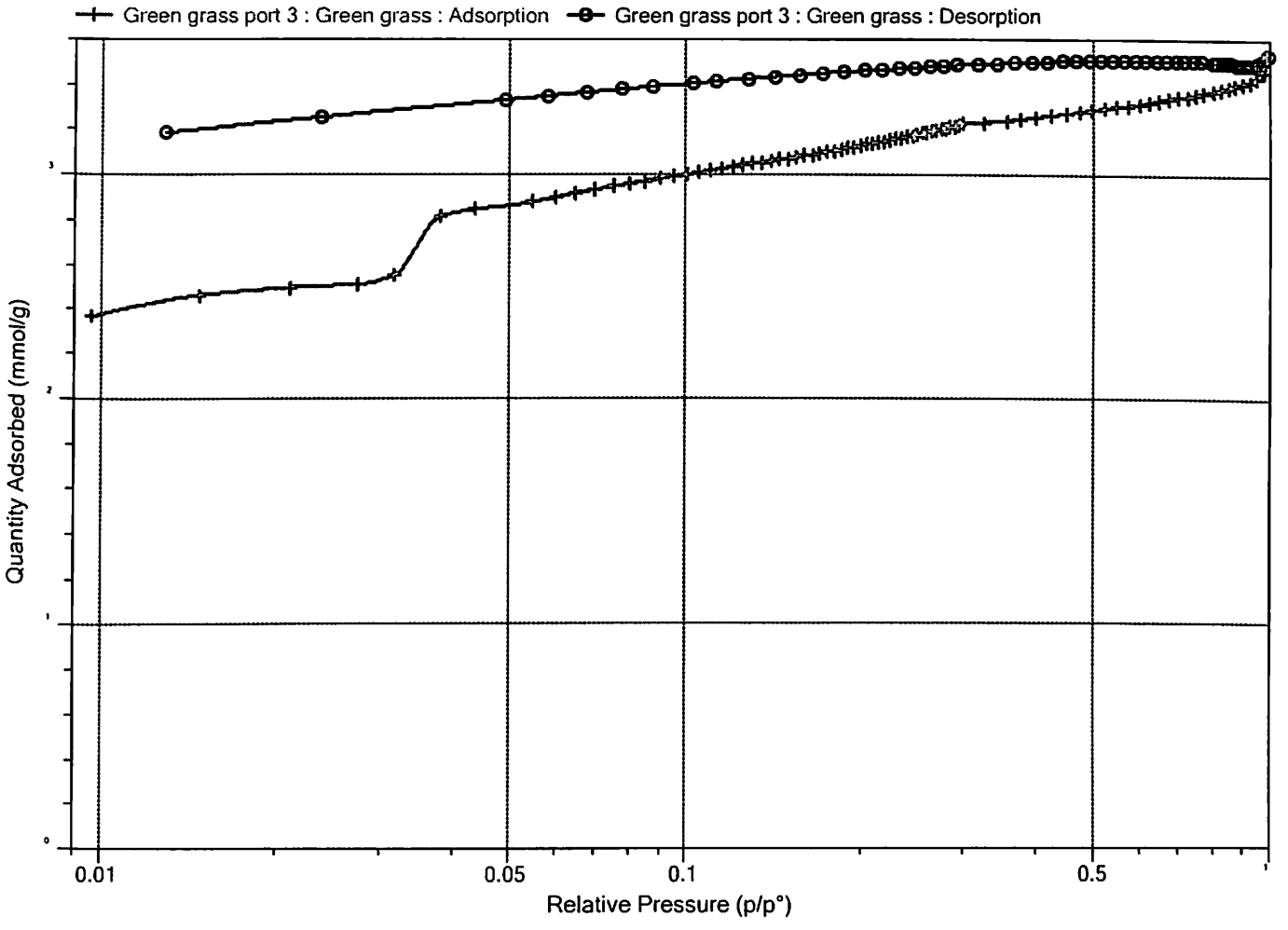
Isotherm Log Plot



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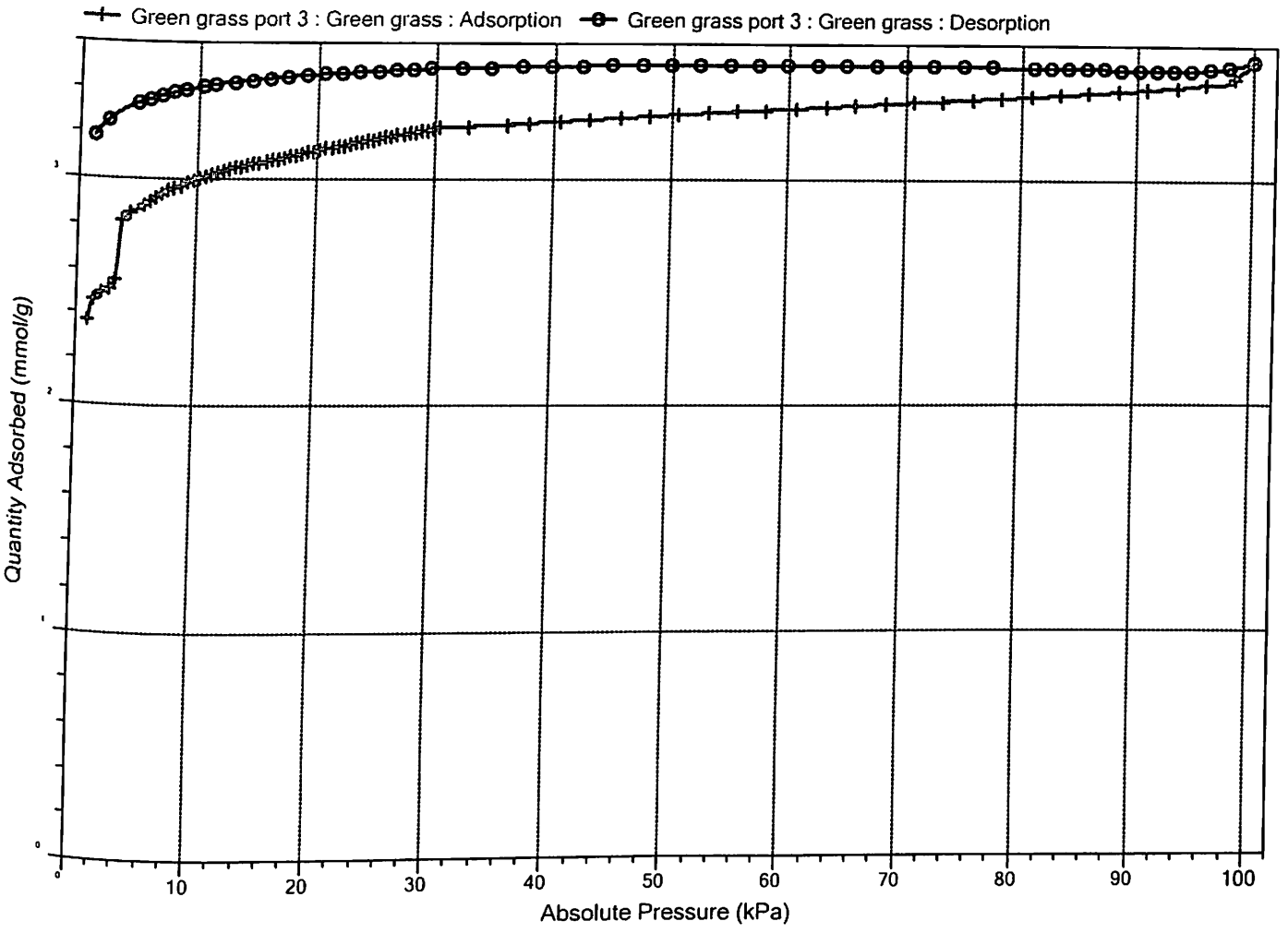
Automatic degas:	No		

Isotherm Linear Absolute Plot



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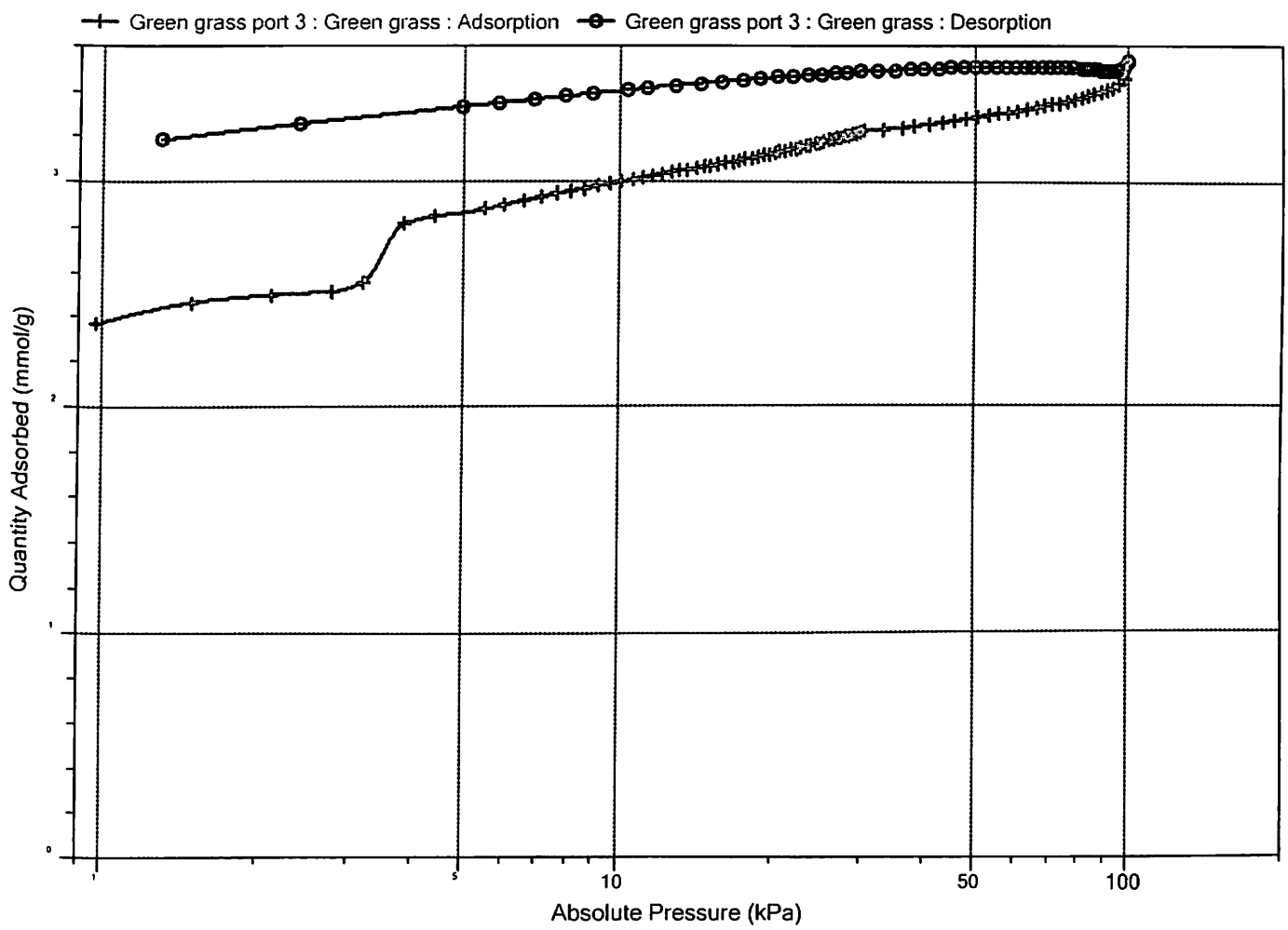
Automatic degas:	No		

Isotherm Log Absolute Plot



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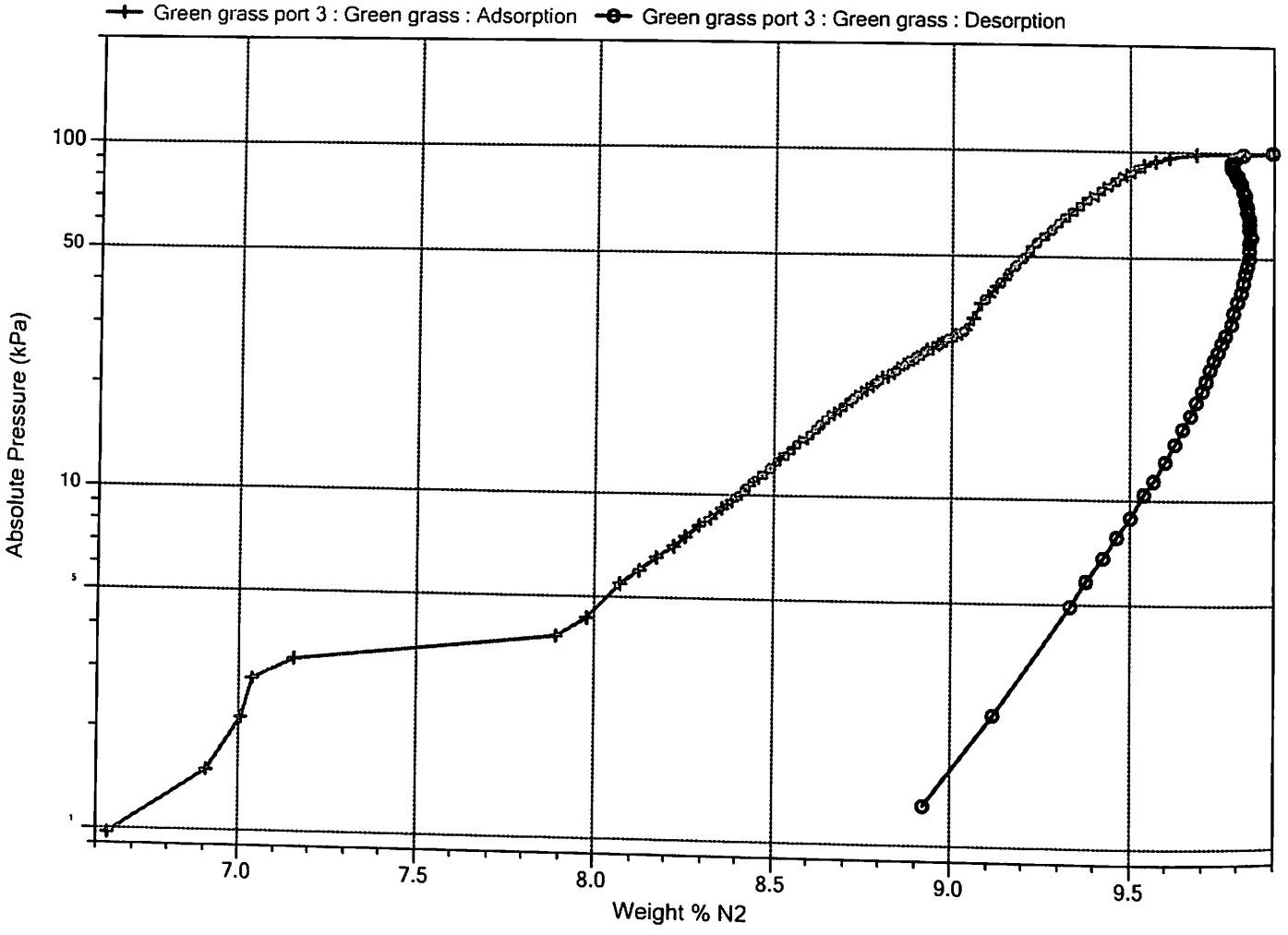
Sample: Green grass
Operator:
Submitter:
File: D:\SEC\Data from Surface ana...\Green grass port 3.SMP

Started:	03-Mar-17 9:08:52 PM	Analysis adsorptive:	N2
Completed:	05-Mar-17 5:25:47 AM	Analysis bath temp.:	77.100 K
Report time:	08-Mar-17 2:54:14 PM	Thermal correction:	No
Sample mass:	0.1928 g	Warm free space:	18.5799 cm³ Measured
Cold free space:	63.1278 cm³	Equilibration interval:	10 s
Low pressure dose:	None	Sample density:	1.000 g/cm³
Automatic degas:	No		

Isotherm Pressure Composition



Sample: Green grass
Operator:
Submitter:
File: D:\SEC\Data from Surface ana...\Green grass port 3.SMP

Started:	03-Mar-17 9:08:52 PM	Analysis adsorptive:	N2
Completed:	05-Mar-17 5:25:47 AM	Analysis bath temp.:	77.100 K
Report time:	08-Mar-17 2:54:14 PM	Thermal correction:	No
Sample mass:	0.1928 g	Warm free space:	18.5799 cm^3 Measured
Cold free space:	63.1278 cm^3	Equilibration interval:	10 s
Low pressure dose:	None	Sample density:	1.000 g/cm^3
Automatic degas:	No		

BET Report

BET surface area:	218.0418 ± 2.1457 m^2/g
Slope:	0.456548 ± 0.004325 g/mmol
Y-intercept:	-0.009115 ± 0.000828 g/mmol
C:	-49.087114
Qm:	2.23497 mmol/g
Correlation coefficient:	0.9978535
Molecular cross-sectional area:	0.1620 nm^2

Relative Pressure (p/p°)	Quantity Adsorbed (mmol/g)	1/[Q(p°/p - 1)]
0.054658805	2.87968	0.02008
0.059731495	2.89923	0.02191
0.064838421	2.91794	0.02376
0.070028438	2.93419	0.02566
0.075147425	2.94688	0.02757
0.080220217	2.95945	0.02947
0.085151172	2.97180	0.03132
0.090095167	2.98175	0.03321
0.095317003	2.99178	0.03522
0.100108935	3.00118	0.03707
0.105258222	3.00948	0.03909
0.109989550	3.01870	0.04094
0.115130705	3.02615	0.04300
0.120144222	3.03379	0.04501
0.125063734	3.04114	0.04700
0.130137765	3.04794	0.04908
0.134935884	3.05425	0.05107
0.139912977	3.06042	0.05315
0.144954635	3.06674	0.05528
0.149828479	3.07288	0.05735
0.154819984	3.07855	0.05950
0.159805680	3.08381	0.06168

Sample: Green grass
Operator:
Submitter:
File: D:\SEC\Data from Surface ana...\Green grass port 3.SMP

Started:	03-Mar-17 9:08:52 PM	Analysis adsorptive:	N2
Completed:	05-Mar-17 5:25:47 AM	Analysis bath temp.:	77.100 K
Report time:	08-Mar-17 2:54:14 PM	Thermal correction:	No
Sample mass:	0.1928 g	Warm free space:	18.5799 cm³ Measured
Cold free space:	63.1278 cm³	Equilibration interval:	10 s
Low pressure dose:	None	Sample density:	1.000 g/cm³
Automatic degas:	No		

Relative Pressure (p/p°)	Quantity Adsorbed (mmol/g)	1/[Q(p°/p - 1)]
0.165134078	3.08921	0.06403
0.170028158	3.09484	0.06619
0.174989307	3.10027	0.06842
0.180016781	3.10555	0.07069
0.184968134	3.11113	0.07295
0.189977538	3.11651	0.07526
0.195000552	3.12187	0.07759
0.199647149	3.12701	0.07977
0.204857433	3.13226	0.08225
0.209933129	3.13769	0.08469
0.214939002	3.14291	0.08711
0.219880274	3.14820	0.08953
0.224880764	3.15331	0.09201
0.229641896	3.15834	0.09438
0.235085727	3.16336	0.09715
0.239931240	3.16833	0.09963
0.244943834	3.17330	0.10223
0.249737507	3.17809	0.10474
0.255000496	3.18289	0.10754
0.259910538	3.18785	0.11016
0.264790263	3.19273	0.11281
0.269884027	3.19759	0.11560
0.274963055	3.20234	0.11843
0.279523386	3.20698	0.12098
0.284543863	3.21160	0.12384
0.289664255	3.21631	0.12679
0.294509818	3.22081	0.12961
0.299581838	3.22551	0.13260

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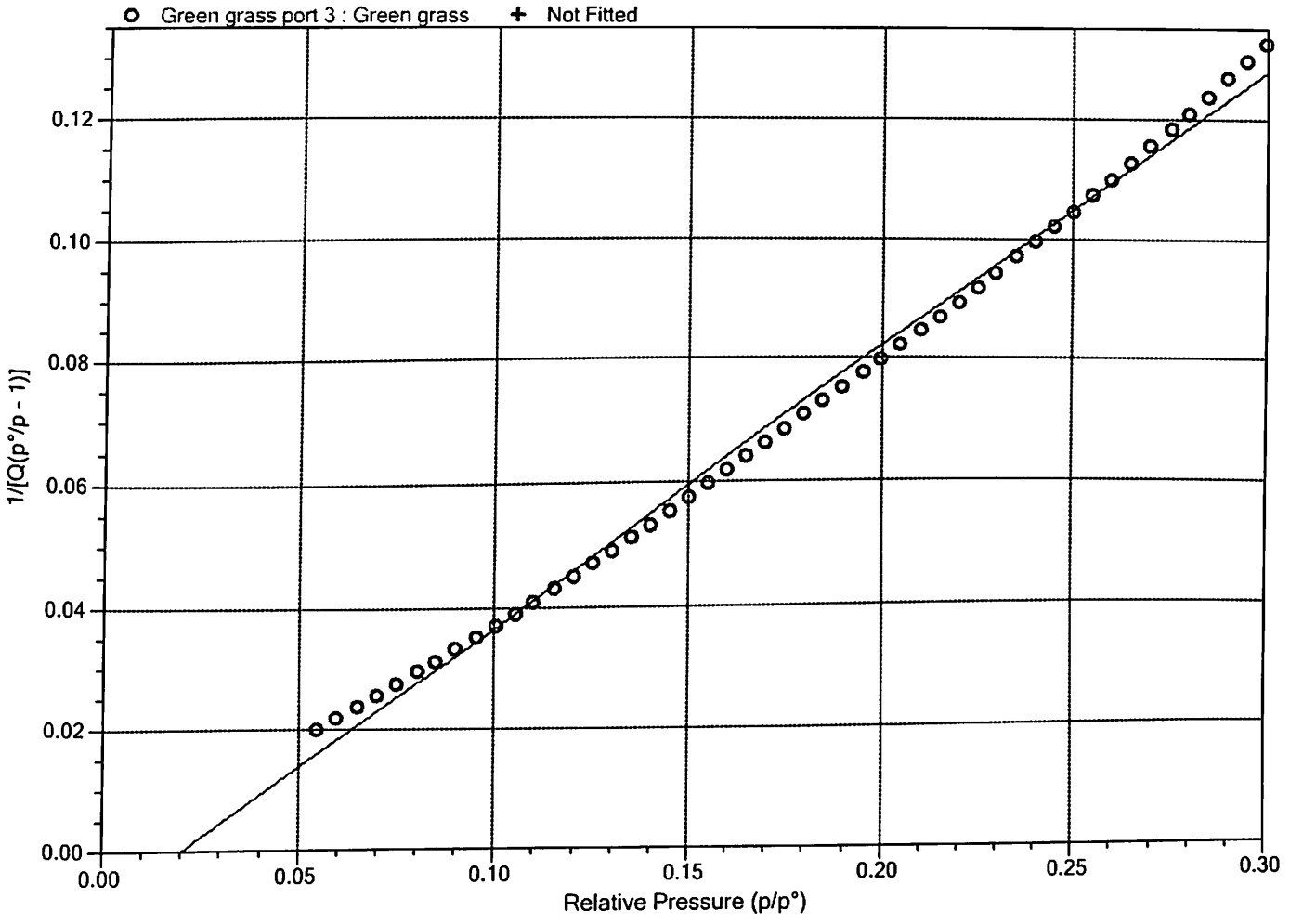
Sample: Green grass
Operator:
Submitter:
File: D:\SEC\Data from Surface ana...\Green grass port 3.SMP

Started:	03-Mar-17 9:08:52 PM	Analysis adsorptive:	N2
Completed:	05-Mar-17 5:25:47 AM	Analysis bath temp.:	77.100 K
Report time:	08-Mar-17 2:54:14 PM	Thermal correction:	No
Sample mass:	0.1928 g	Warm free space:	18.5799 cm³ Measured
Cold free space:	63.1278 cm³	Equilibration interval:	10 s
Low pressure dose:	None	Sample density:	1.000 g/cm³
Automatic degas:	No		

BET Surface Area Plot



Sample: Green grass
Operator:
Submitter:
File: D:\SEC\Data from Surface ana...\Green grass port 3.SMP

Started:	03-Mar-17 9:08:52 PM	Analysis adsorptive:	N2
Completed:	05-Mar-17 5:25:47 AM	Analysis bath temp.:	77.100 K
Report time:	08-Mar-17 2:54:14 PM	Thermal correction:	No
Sample mass:	0.1928 g	Warm free space:	18.5799 cm³ Measured
Cold free space:	63.1278 cm³	Equilibration interval:	10 s
Low pressure dose:	None	Sample density:	1.000 g/cm³
Automatic degas:	No		

Langmuir Report

Langmuir surface area:	337.1899 ± 0.9530 m²/g
Slope:	0.28933 ± 0.00082 g/mmol
Y-intercept:	0.530 ± 0.035 g/mmol·kPa
b:	0.54605 1/kPa
Qm:	3.45626 mmol/g
Correlation coefficient:	0.999669
Molecular cross-sectional area:	0.1620 nm²

Pressure (kPa)	Quantity Adsorbed (mmol/g)	p/Q (g/mmol·kPa)
0.9739435	2.36771	0.411
1.4915545	2.46528	0.605
2.1175789	2.49965	0.847
2.7744704	2.51267	1.104
3.1979754	2.55514	1.252
3.8467162	2.81597	1.366
4.3987222	2.84710	1.545
5.5168846	2.87968	1.916
6.0309441	2.89923	2.080
6.5473838	2.91794	2.244
7.0721948	2.93419	2.410
7.5894101	2.94688	2.575
8.1018935	2.95945	2.738
8.6002387	2.97180	2.894
9.1000797	2.98175	3.052
9.6282794	2.99178	3.218
10.1124265	3.00118	3.369
10.6326618	3.00948	3.533
11.1107384	3.01870	3.681
11.6302962	3.02615	3.843
12.1369726	3.03379	4.001
12.6345474	3.04114	4.155

Sample: Green grass
Operator:
Submitter:
File: D:\SEC\Data from Surface ana...\Green grass port 3.SMP

Started:	03-Mar-17 9:08:52 PM	Analysis adsorptive:	N2
Completed:	05-Mar-17 5:25:47 AM	Analysis bath temp.:	77.100 K
Report time:	08-Mar-17 2:54:14 PM	Thermal correction:	No
Sample mass:	0.1928 g	Warm free space:	18.5799 cm³ Measured
Cold free space:	63.1278 cm³	Equilibration interval:	10 s
Low pressure dose:	None	Sample density:	1.000 g/cm³
Automatic degas:	No		

Pressure (kPa)	Quantity Adsorbed (mmol/g)	p/Q (g/mmol·kPa)
13.1471020	3.04794	4.313
13.6313640	3.05425	4.463
14.1348770	3.06042	4.619
14.6445551	3.06674	4.775
15.1369219	3.07288	4.926
15.6419688	3.07855	5.081
16.1453272	3.08381	5.236
16.6840179	3.08921	5.401
17.1785778	3.09484	5.551
17.6803779	3.10027	5.703
18.1882505	3.10555	5.857
18.6860836	3.11113	6.006
19.1936897	3.11651	6.159
19.7006305	3.12187	6.311
20.1717284	3.12701	6.451
20.6980076	3.13226	6.608
21.2101360	3.13769	6.760
21.7152236	3.14291	6.909
22.2133456	3.14820	7.056
22.7191025	3.15331	7.205
23.1993426	3.15834	7.345
23.7493748	3.16336	7.508
24.2401976	3.16833	7.651
24.7459830	3.17330	7.798
25.2309306	3.17809	7.939
25.7637034	3.18289	8.094
26.2599091	3.18785	8.238
26.7535067	3.19273	8.380
27.2677285	3.19759	8.528
27.7814518	3.20234	8.675
28.2435151	3.20698	8.807

Sample: Green grass
Operator:
Submitter:
File: D:\SEC\Data from Surface ana...\Green grass port 3.SMP

Started:	03-Mar-17 9:08:52 PM	Analysis adsorptive:	N2
Completed:	05-Mar-17 5:25:47 AM	Analysis bath temp.:	77.100 K
Report time:	08-Mar-17 2:54:14 PM	Thermal correction:	No
Sample mass:	0.1928 g	Warm free space:	18.5799 cm³ Measured
Cold free space:	63.1278 cm³	Equilibration interval:	10 s
Low pressure dose:	None	Sample density:	1.000 g/cm³
Automatic degas:	No		

Pressure (kPa)	Quantity Adsorbed (mmol/g)	p/Q (g/mmol·kPa)
28.7495446	3.21160	8.952
29.2682765	3.21631	9.100
29.7582489	3.22081	9.239
30.2695432	3.22551	9.384
32.7921879	3.23232	10.145
36.0581107	3.24062	11.127
37.8821107	3.24802	11.663
40.4313198	3.25586	12.418
42.9337106	3.26350	13.156
45.4446660	3.27138	13.892
47.9958931	3.27893	14.638
50.4620035	3.28632	15.355
52.9925089	3.29368	16.089
55.5669072	3.30108	16.833
58.0246727	3.30825	17.539
60.5807660	3.31520	18.274
63.1557258	3.32257	19.008
65.6851651	3.32967	19.727
68.2020323	3.33699	20.438
70.6613521	3.34383	21.132
73.1990102	3.35083	21.845
75.7269849	3.35768	22.553
78.2564487	3.36479	23.257
80.8182422	3.37235	23.965
83.3301781	3.37977	24.656
85.8439775	3.38764	25.340
88.3293287	3.39588	26.011
90.9149239	3.40522	26.699
93.4374872	3.41620	27.351
95.9708651	3.43013	27.979
98.4644187	3.45657	28.486

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Sample: Green grass
Operator:
Submitter:
File: D:\SEC\Data from Surface ana...\Green grass port 3.SMP

Started:	03-Mar-17 9:08:52 PM	Analysis adsorptive:	N2
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Report time:	08-Mar-17 2:54:14 PM	Thermal correction:	No
Sample mass:	0.1928 g	Warm free space:	18.5799 cm³ Measured
Cold free space:	63.1278 cm³	Equilibration interval:	10 s
Low pressure dose:	None	Sample density:	1.000 g/cm³
Automatic degas:	No		

Pressure (kPa)	Quantity Adsorbed (mmol/g)	p/Q (g/mmol·kPa)
100.0660615	3.53228	28.329

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Sample: Green grass
Operator:
Submitter:
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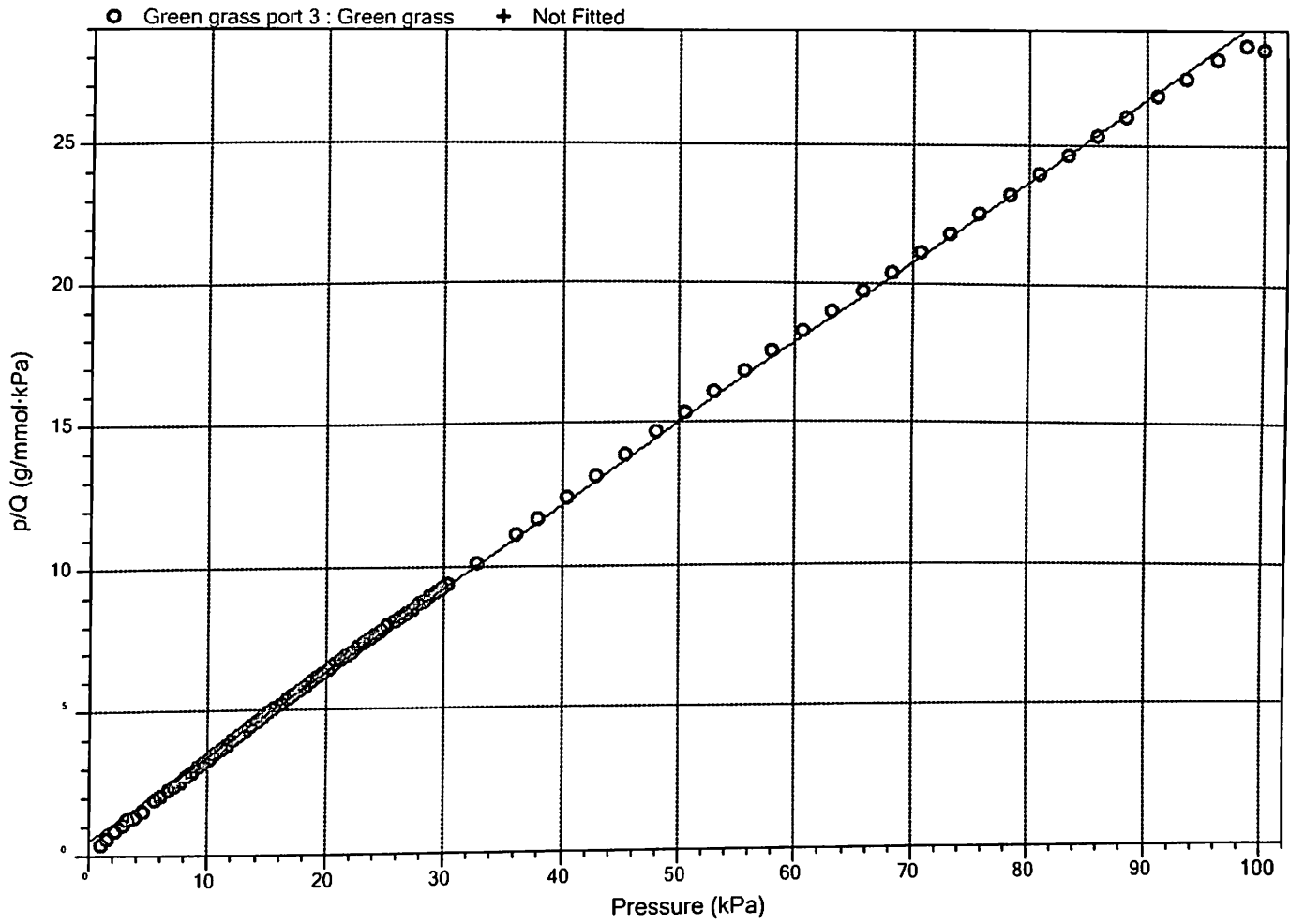
Completed:	05-Mar-17 5:25:47 AM	Analysis bath temp.:	77.100 K
Report time:	08-Mar-17 2:54:14 PM	Thermal correction:	No
Sample mass:	0.1928 g	Warm free space:	18.5799 cm³ Measured
Cold free space:	63.1278 cm³	Equilibration interval:	10 s
Low pressure dose:	None	Sample density:	1.000 g/cm³
Automatic degas:	No		

Langmuir Surface Area Plot



Sample: Green grass
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Started:	03-Mar-17 9:08:52 PM	Analysis adsorptive:	N2
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Sample mass:	0.1928 g	Warm free space:	18.5799 cm³ Measured
Cold free space:	63.1278 cm³	Equilibration interval:	10 s
Low pressure dose:	None	Sample density:	1.000 g/cm³
Automatic degas:	No		

BJH Adsorption Pore Distribution Report

Faas Correction
Harkins and Jura
t = [13.99 / (0.034 - log(p/p°))] ^ 0.5

Width range:	17.000 Å to 3,000.000 Å
Adsorbate property factor:	9.53000 Å
Density conversion factor:	0.0015483
Fraction of pores open at both ends:	0.00

Pore Width Range (Å)	Average Width (Å)	Incremental Pore Volume (cm³/g)	Cumulative Pore Volume (cm³/g)	Incremental Pore Area (m²/g)	Cumulative Pore Area (m²/g)
2096.1 - 778.8	931.4	0.002838	0.002838	0.122	0.122
778.8 - 403.5	479.0	0.001027	0.003865	0.086	0.208
403.5 - 273.0	312.5	0.000552	0.004417	0.071	0.278
273.0 - 207.3	230.6	0.000449	0.004866	0.078	0.356
207.3 - 166.6	182.2	0.000392	0.005258	0.086	0.442
166.6 - 140.2	150.9	0.000356	0.005613	0.094	0.537
140.2 - 120.8	128.9	0.000349	0.005963	0.108	0.645
120.8 - 106.1	112.4	0.000336	0.006299	0.120	0.765
106.1 - 94.3	99.4	0.000353	0.006652	0.142	0.907
94.3 - 84.9	89.0	0.000338	0.006990	0.152	1.058
84.9 - 77.1	80.5	0.000331	0.007320	0.164	1.223
77.1 - 70.5	73.4	0.000347	0.007668	0.189	1.412
70.5 - 65.0	67.5	0.000346	0.008014	0.205	1.617
65.0 - 60.2	62.4	0.000381	0.008394	0.244	1.861
60.2 - 55.9	57.9	0.000372	0.008766	0.257	2.118
55.9 - 52.0	53.8	0.000394	0.009159	0.293	2.410
52.0 - 48.6	50.2	0.000371	0.009530	0.295	2.705
48.6 - 45.7	47.1	0.000395	0.009925	0.336	3.041
45.7 - 42.9	44.2	0.000410	0.010335	0.372	3.413
42.9 - 40.4	41.5	0.000413	0.010749	0.398	3.811
40.4 - 38.1	39.2	0.000422	0.011170	0.431	4.241

Sample: Green grass
Operator:
Submitter:
File: D:\SEC\Data from Surface ana...\Green grass port 3.SMP

Started:	03-Mar-17 9:08:52 PM	Analysis adsorptive:	N2
Completed:	05-Mar-17 5:25:47 AM	Analysis bath temp.:	77.100 K
Report time:	08-Mar-17 2:54:14 PM	Thermal correction:	No
Sample mass:	0.1928 g	Warm free space:	18.5799 cm³ Measured
Cold free space:	63.1278 cm³	Equilibration interval:	10 s
Low pressure dose:	None	Sample density:	1.000 g/cm³
Automatic degas:	No		

Pore Width Range (Å)	Average Width (Å)	Incremental Pore Volume (cm³/g)	Cumulative Pore Volume (cm³/g)	Incremental Pore Area (m²/g)	Cumulative Pore Area (m²/g)
38.1 - 36.0	37.0	0.000433	0.011603	0.468	4.709
36.0 - 34.0	34.9	0.000463	0.012065	0.530	5.239
34.0 - 32.2	33.0	0.000445	0.012510	0.538	5.777
32.2 - 30.5	31.3	0.000459	0.012969	0.587	6.365
30.5 - 29.3	29.8	0.000480	0.013449	0.643	7.008
29.3 - 27.3	28.2	0.000428	0.013877	0.607	7.614
27.3 - 25.8	26.5	0.000364	0.014241	0.550	8.164
25.8 - 25.5	25.7	0.000380	0.014621	0.592	8.756
25.5 - 25.3	25.4	0.000364	0.014985	0.572	9.329
25.3 - 25.0	25.1	0.000378	0.015363	0.602	9.931
25.0 - 24.7	24.8	0.000371	0.015734	0.597	10.527
24.7 - 24.5	24.6	0.000377	0.016111	0.614	11.141
24.5 - 24.2	24.3	0.000380	0.016491	0.624	11.766
24.2 - 23.9	24.0	0.000389	0.016880	0.647	12.413
23.9 - 23.7	23.8	0.000393	0.017272	0.660	13.073
23.7 - 23.4	23.5	0.000398	0.017671	0.677	13.750
23.4 - 23.1	23.3	0.000375	0.018046	0.646	14.396
23.1 - 22.9	23.0	0.000382	0.018428	0.665	15.061
22.9 - 22.6	22.7	0.000393	0.018821	0.692	15.753
22.6 - 22.4	22.5	0.000396	0.019217	0.705	16.458
22.4 - 22.1	22.2	0.000386	0.019603	0.695	17.153
22.1 - 21.8	22.0	0.000400	0.020004	0.730	17.882
21.8 - 21.6	21.7	0.000402	0.020405	0.740	18.623
21.6 - 21.3	21.5	0.000419	0.020824	0.781	19.403
21.3 - 21.1	21.2	0.000408	0.021231	0.769	20.172
21.1 - 20.8	20.9	0.000426	0.021657	0.813	20.985
20.8 - 20.6	20.7	0.000401	0.022058	0.774	21.760
20.6 - 20.3	20.4	0.000403	0.022461	0.788	22.548
20.3 - 20.1	20.2	0.000412	0.022873	0.816	23.364
20.1 - 19.8	20.0	0.000412	0.023284	0.825	24.188
19.8 - 19.6	19.7	0.000432	0.023716	0.876	25.065

Sample: Green grass
Operator:
Submitter:
File: D:\SEC\Data from Surface ana...\Green grass port 3.SMP

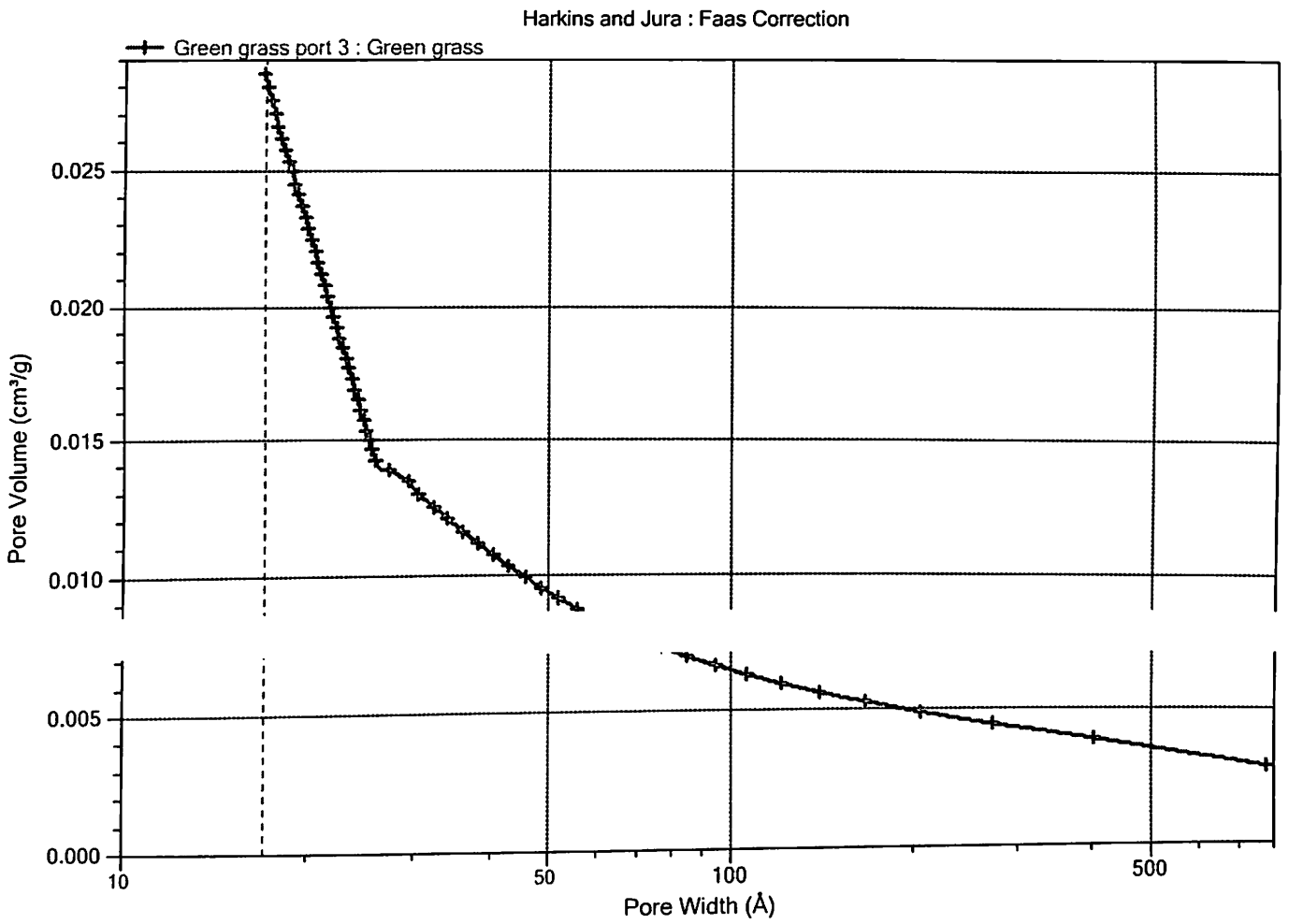
Started:	03-Mar-17 9:08:52 PM	Analysis adsorptive:	N2
Completed:	05-Mar-17 5:25:47 AM	Analysis bath temp.:	77.100 K
Report time:	08-Mar-17 2:54:14 PM	Thermal correction:	No
Sample mass:	0.1928 g	Warm free space:	18.5799 cm³ Measured
Cold free space:	63.1278 cm³	Equilibration interval:	10 s
Low pressure dose:	None	Sample density:	1.000 g/cm³
Automatic degas:	No		

Pore Width Range (Å)	Average Width (Å)	Incremental Pore Volume (cm³/g)	Cumulative Pore Volume (cm³/g)	Incremental Pore Area (m²/g)	Cumulative Pore Area (m²/g)
19.6 - 19.3	19.5	0.000394	0.024110	0.810	25.875
19.3 - 19.1	19.2	0.000408	0.024519	0.850	26.725
19.1 - 18.9	19.0	0.000430	0.024948	0.906	27.630
18.9 - 18.6	18.7	0.000384	0.025332	0.820	28.450
18.6 - 18.4	18.5	0.000377	0.025709	0.815	29.265
18.4 - 18.1	18.2	0.000418	0.026127	0.917	30.182
18.1 - 17.9	18.0	0.000472	0.026599	1.049	31.231
17.9 - 17.6	17.8	0.000480	0.027079	1.081	32.312
17.6 - 17.4	17.5	0.000458	0.027536	1.046	33.358
17.4 - 17.1	17.3	0.000477	0.028014	1.106	34.465
17.1 - 16.9	17.0	0.000513	0.028527	1.205	35.670

Sample: Green grass
Operator:
Submitter:
File: D:\SEC\Data from Surface ana...\Green grass port 3.SMP

Started:	03-Mar-17 9:08:52 PM	Analysis adsorptive:	N2
Completed:	05-Mar-17 5:25:47 AM	Analysis bath temp.:	77.100 K
Report time:	08-Mar-17 2:54:14 PM	Thermal correction:	No
Sample mass:	0.1928 g	Warm free space:	18.5799 cm³ Measured
Cold free space:	63.1278 cm³	Equilibration interval:	10 s
Low pressure dose:	None	Sample density:	1.000 g/cm³
Automatic degas:	No		

BJH Adsorption Cumulative Pore Volume (Larger)

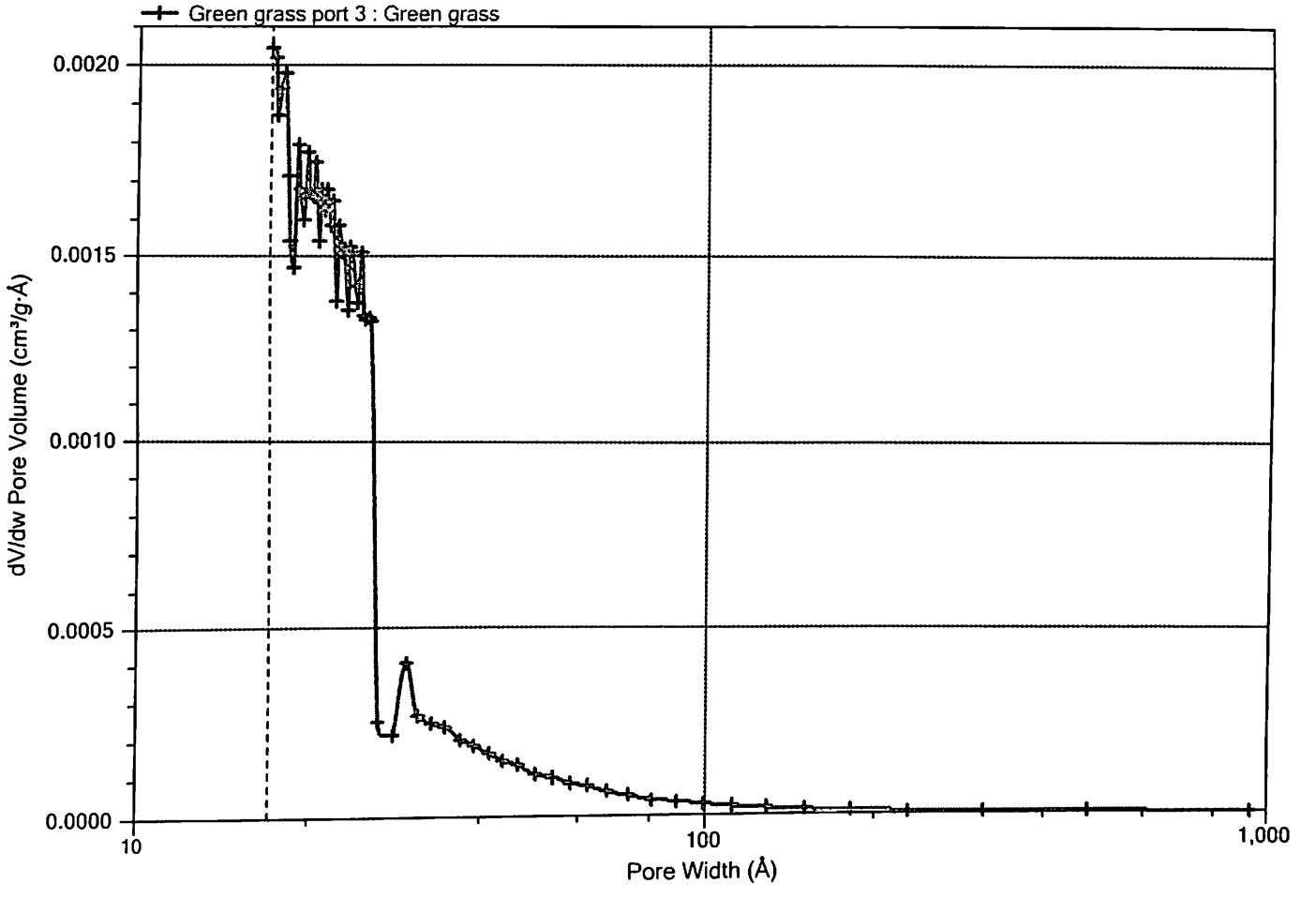


Sample: Green grass
Operator:
Submitter:
File: D:\SEC\Data from Surface ana...\Green grass port 3.SMP

Started:	03-Mar-17 9:08:52 PM	Analysis adsorptive:	N2
Completed:	05-Mar-17 5:25:47 AM	Analysis bath temp.:	77.100 K
Report time:	08-Mar-17 2:54:14 PM	Thermal correction:	No
Sample mass:	0.1928 g	Warm free space:	18.5799 cm³ Measured
Cold free space:	63.1278 cm³	Equilibration interval:	10 s
Low pressure dose:	None	Sample density:	1.000 g/cm³
Automatic degas:	No		

BJH Adsorption dV/dw Pore Volume

Harkins and Jura : Faas Correction



Sample: Green grass
Operator:
Submitter:
File: D:\SEC\Data from Surface ana...\Green grass port 3.SMP

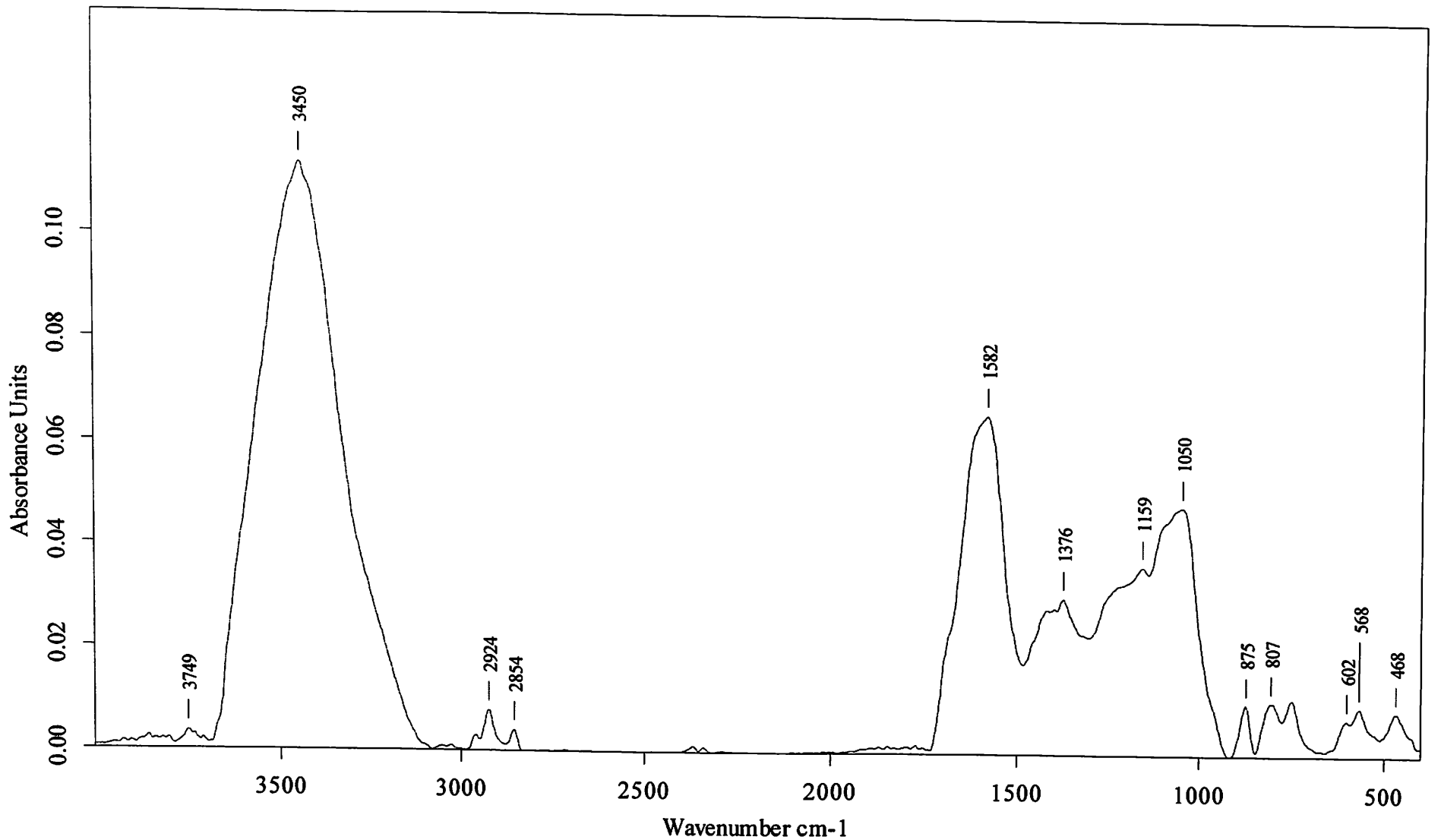
Started:	03-Mar-17 9:08:52 PM	Analysis adsorptive:	N2
Completed:	05-Mar-17 5:25:47 AM	Analysis bath temp.:	77.100 K
Report time:	08-Mar-17 2:54:14 PM	Thermal correction:	No
Sample mass:	0.1928 g	Warm free space:	18.5799 cm^3 Measured
Cold free space:	63.1278 cm^3	Equilibration interval:	10 s
Low pressure dose:	None	Sample density:	1.000 g/cm^3
Automatic degas:	No		

DFT Pore Size Reports

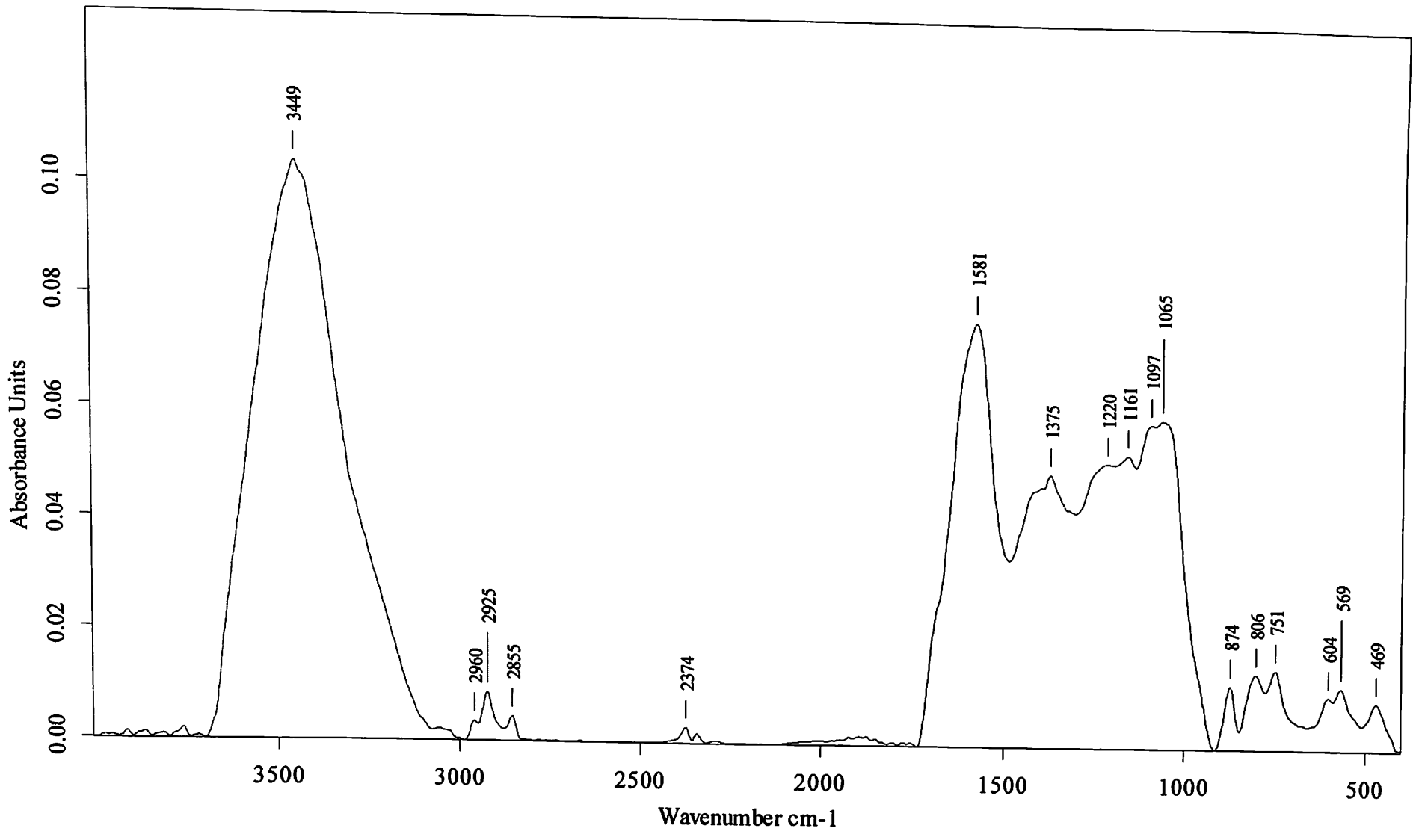
Primary Data
4070- Unable to load deconvolution model Invalid.

ภาคผนวก ข.

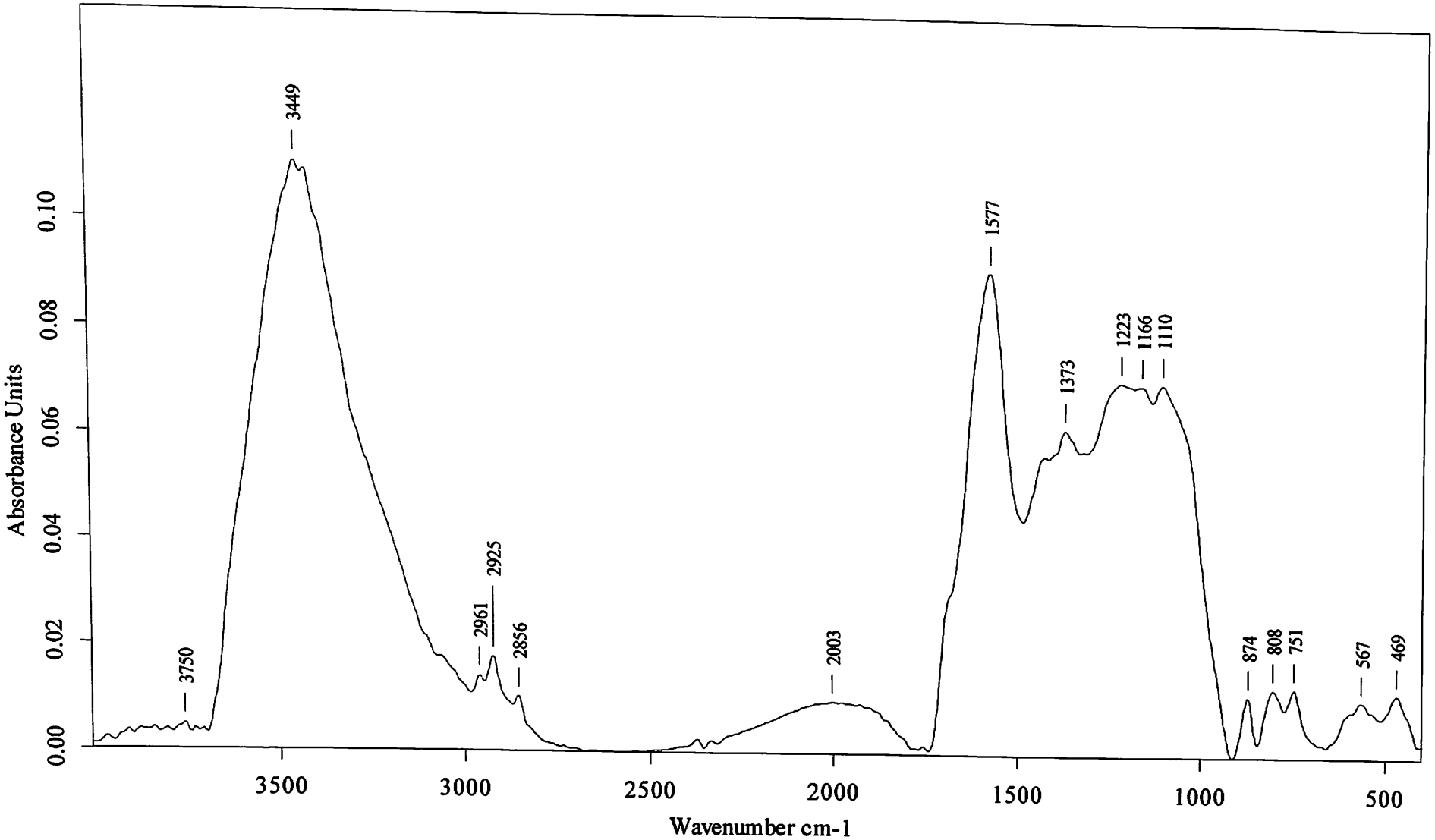
รายงานผลวิเคราะห์ข้อมูลจากเครื่อง FT-IR Spectroscopy



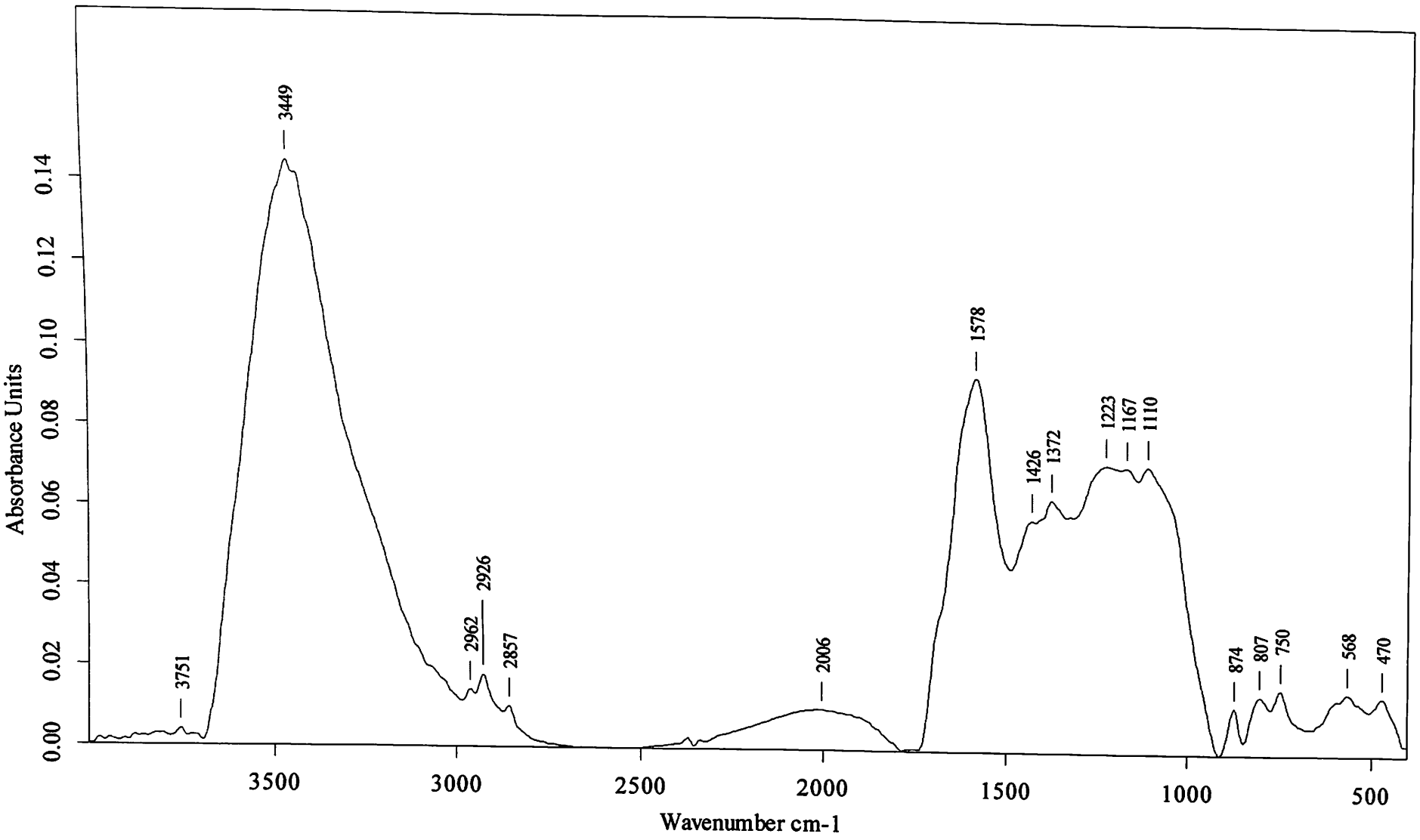
Date of Measurement : 16/07/2018	Sample Name : A01_rep 1
Operator Name : Administrator	Sample Form :
Instrument Type : TENSOR 27	Filename : A01_rep 1.0



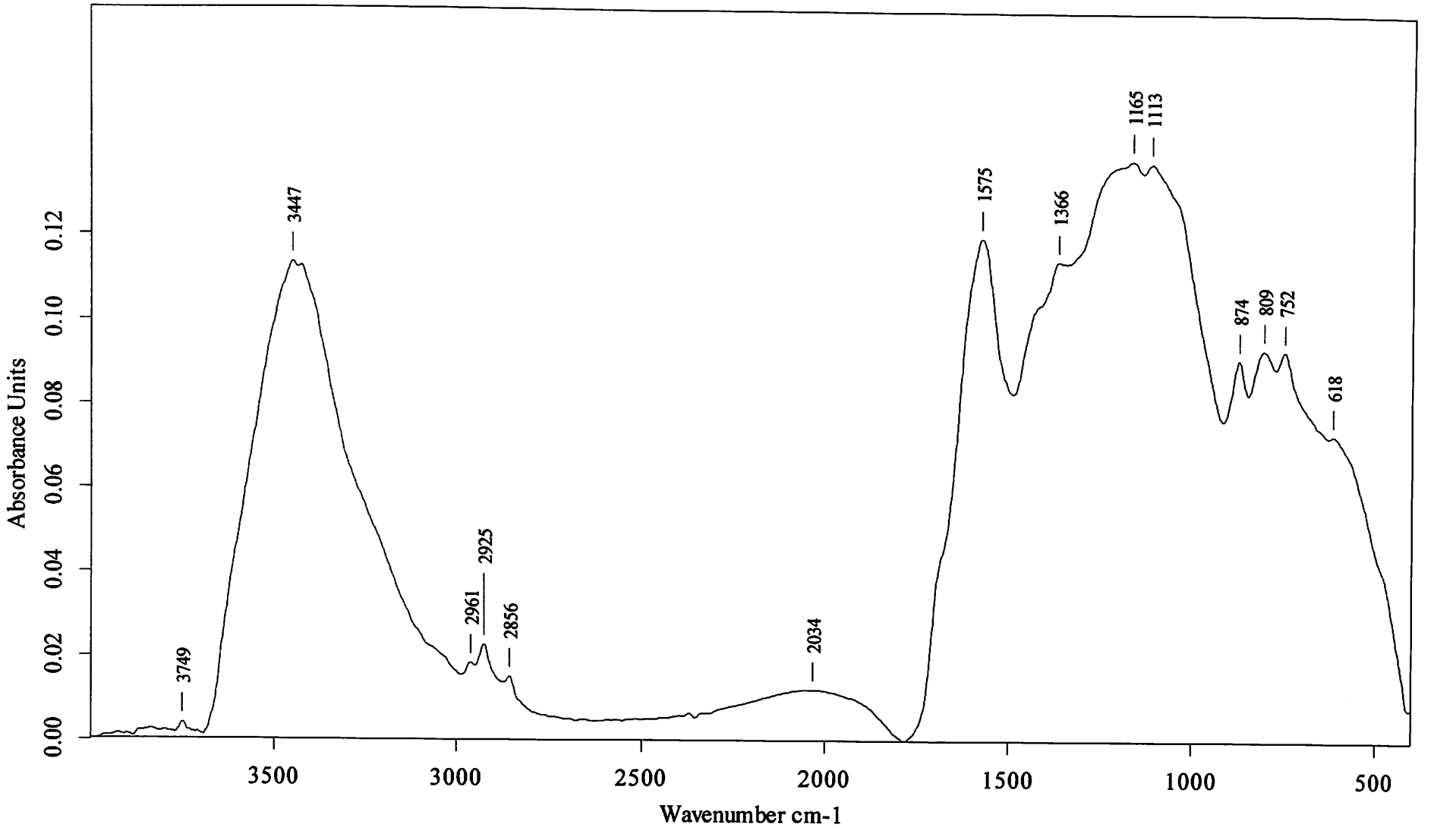
Date of Measurement : 16/07/2018	Sample Name : A01_rep 2
Operator Name : Administrator	Sample Form :
Instrument Type : TENSOR 27	Filename : A01_rep 2.0



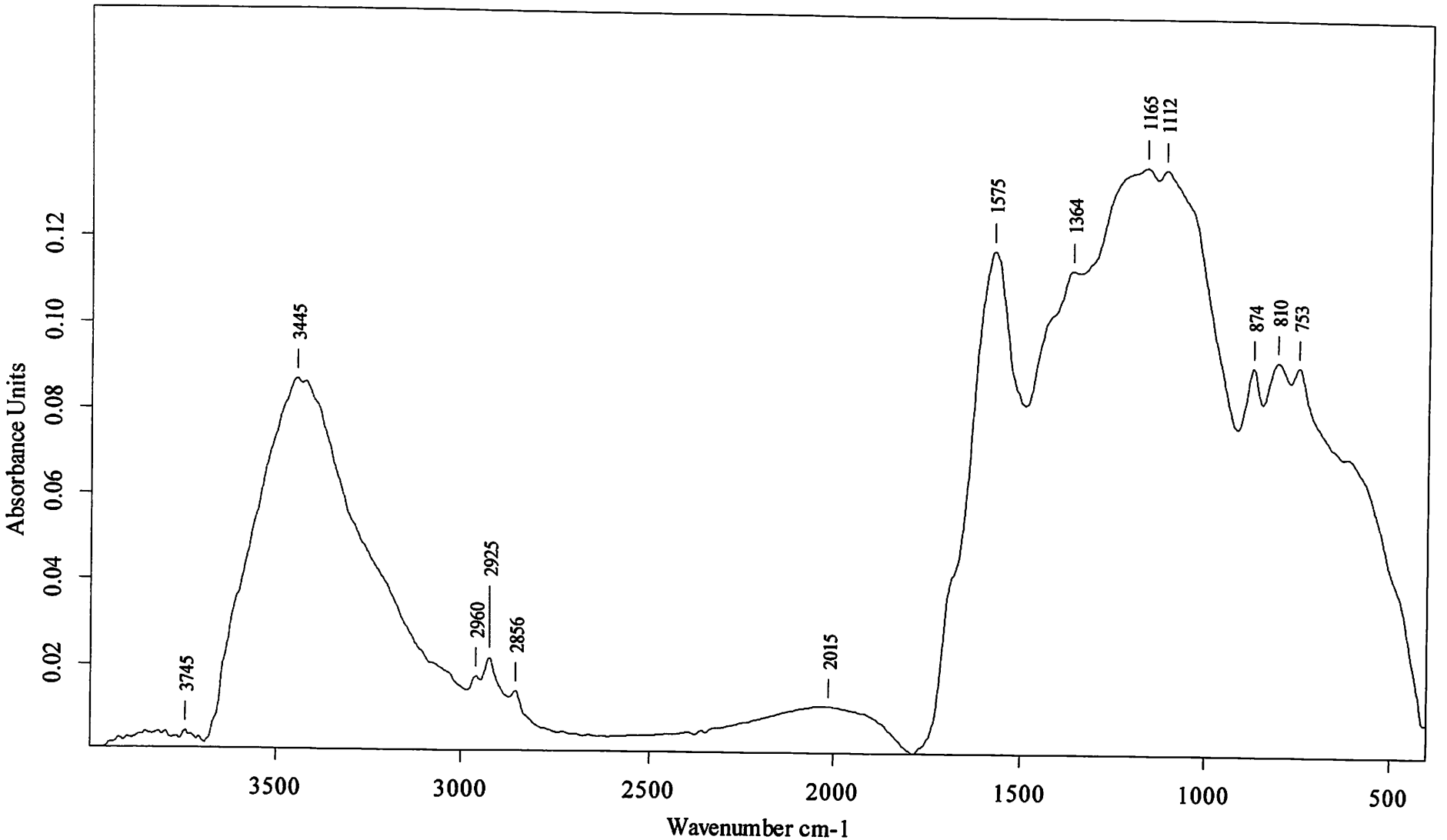
Date of Measurement : 16/07/2018	Sample Name : A02_rep 1
Operator Name : Administrator	Sample Form :
Instrument Type : TENSOR 27	Filename : A02_rep 1.0



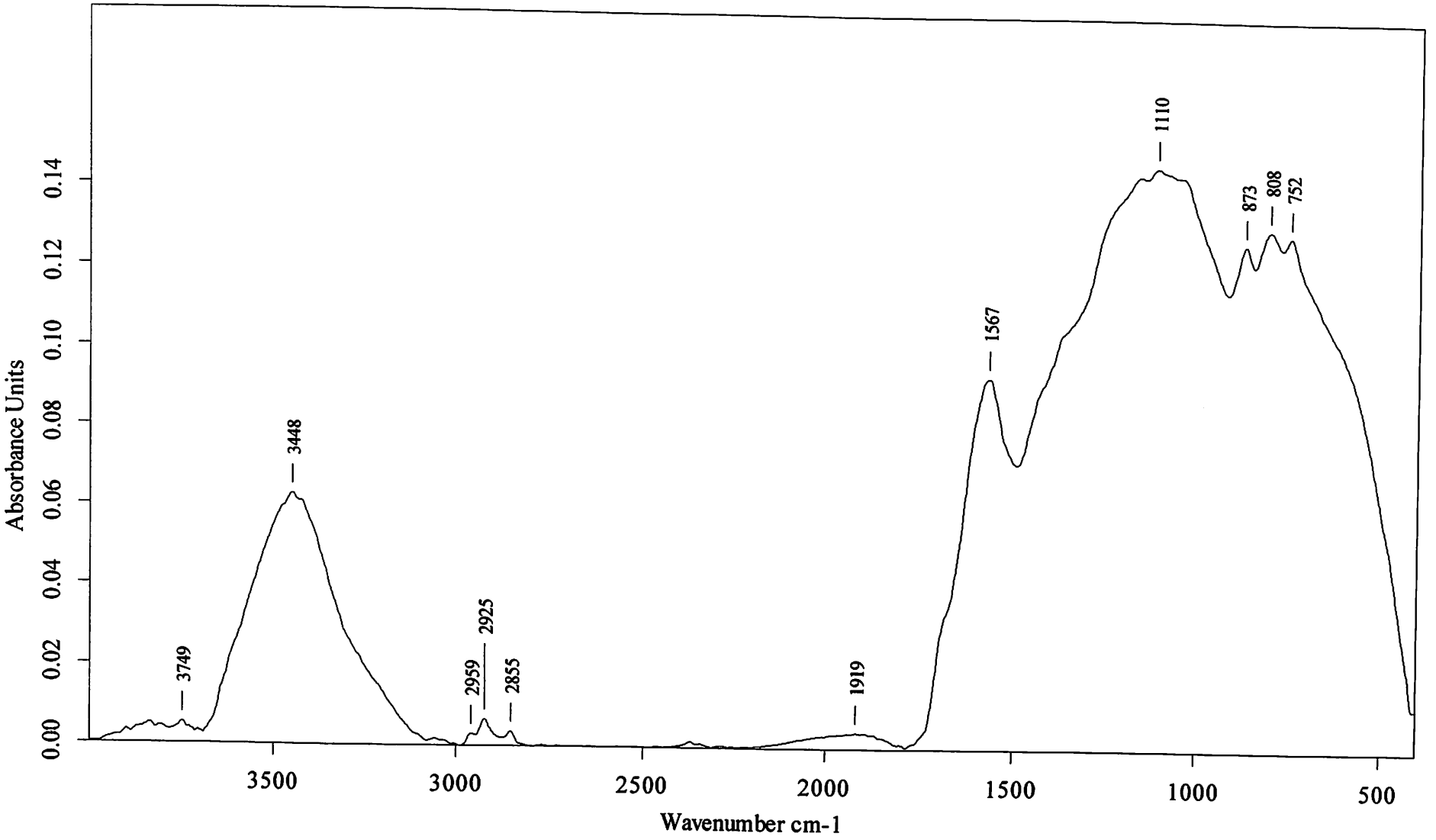
Date of Measurement : 16/07/2018	Sample Name : A02_rep 2
Operator Name : Administrator	Sample Form :
Instrument Type : TENSOR 27	Filename : A02_rep 2.0



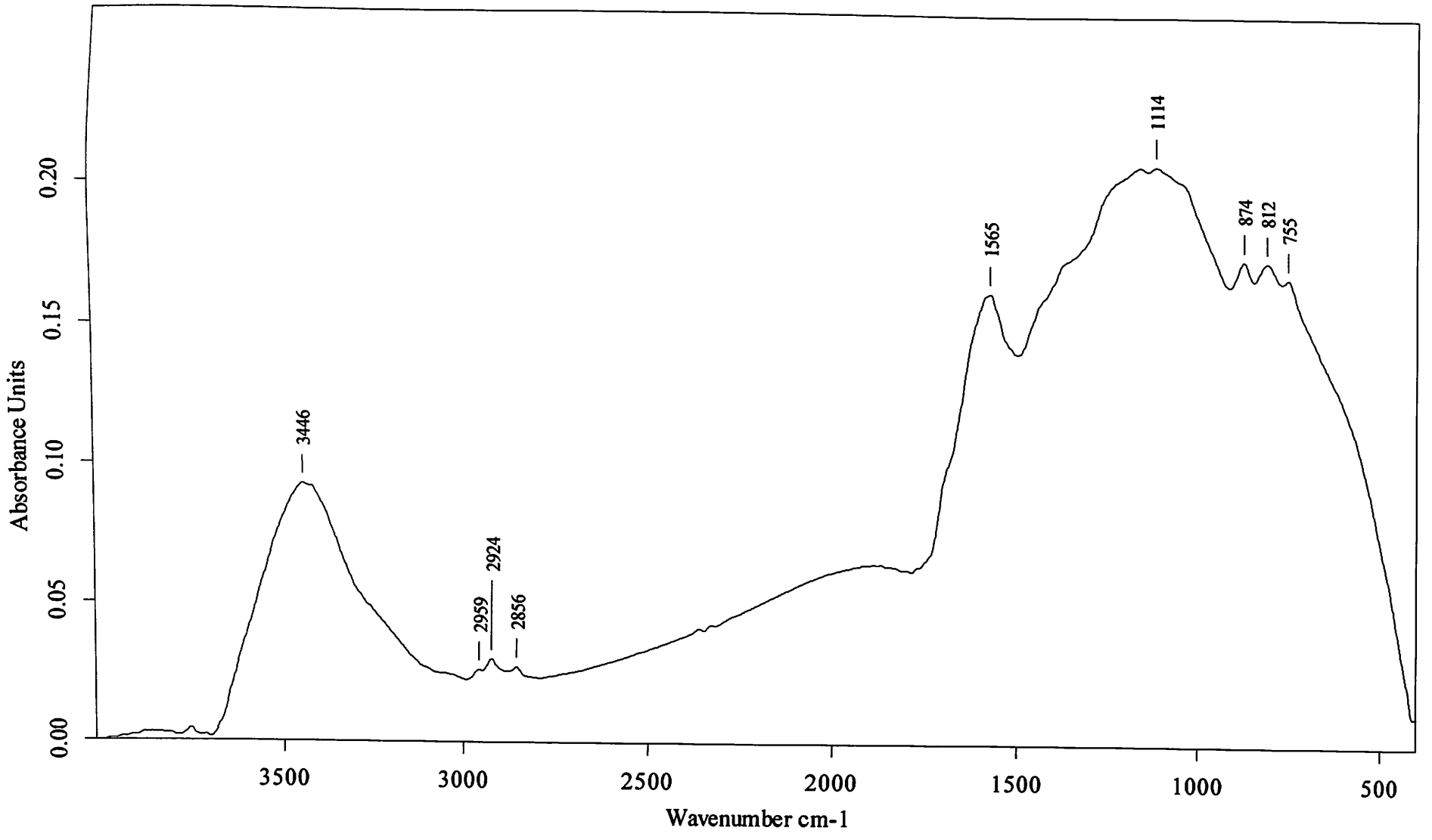
Date of Measurement : 16/07/2018	Sample Name : A03_rep 1
Operator Name : Administrator	Sample Form :
Instrument Type : TENSOR 27	Filename : A03_rep 1.0



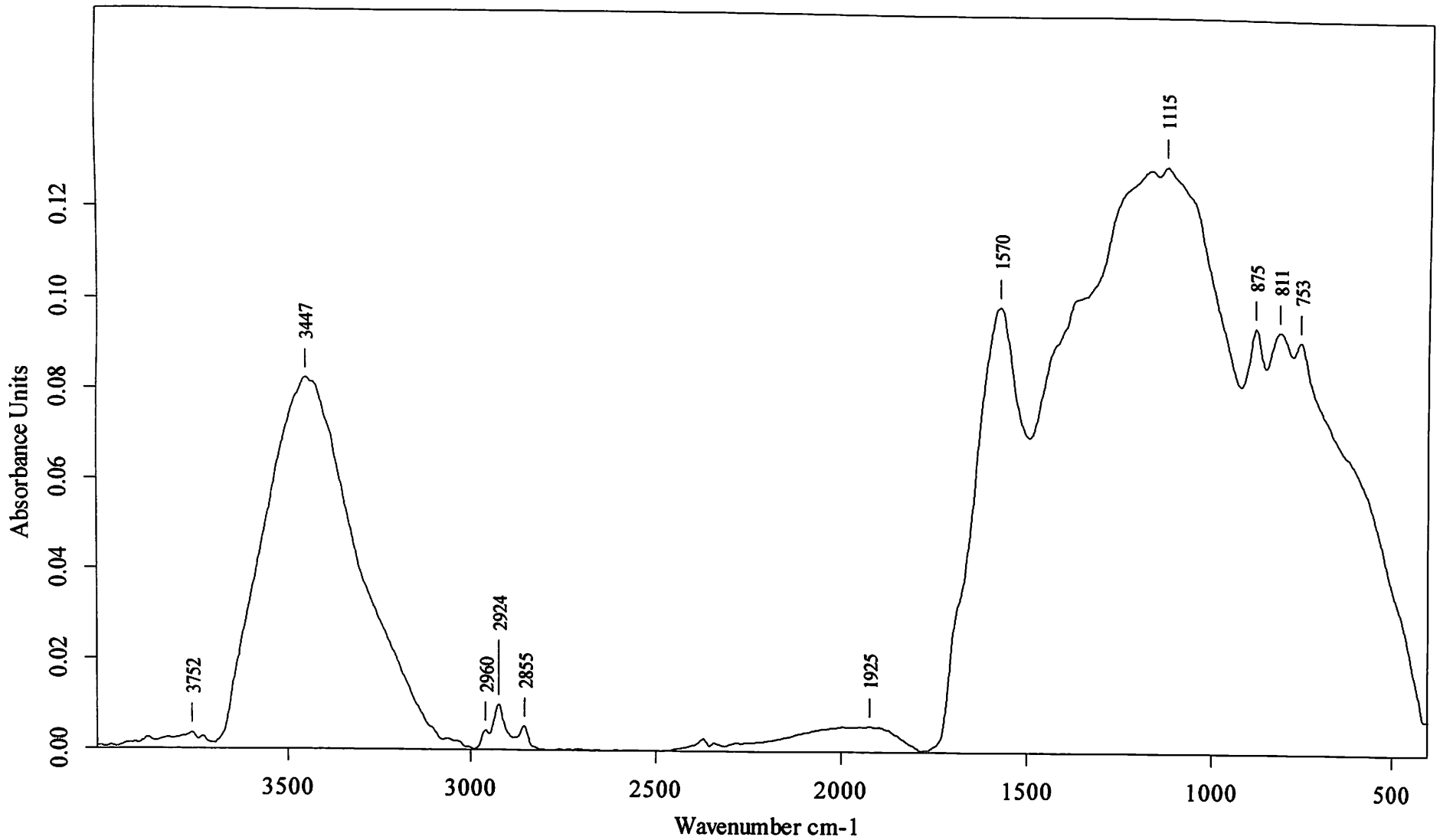
Date of Measurement : 16/07/2018	Sample Name : A03_rep 2
Operator Name : Administrator	Sample Form :
Instrument Type : TENSOR 27	Filename : A03_rep 2.0



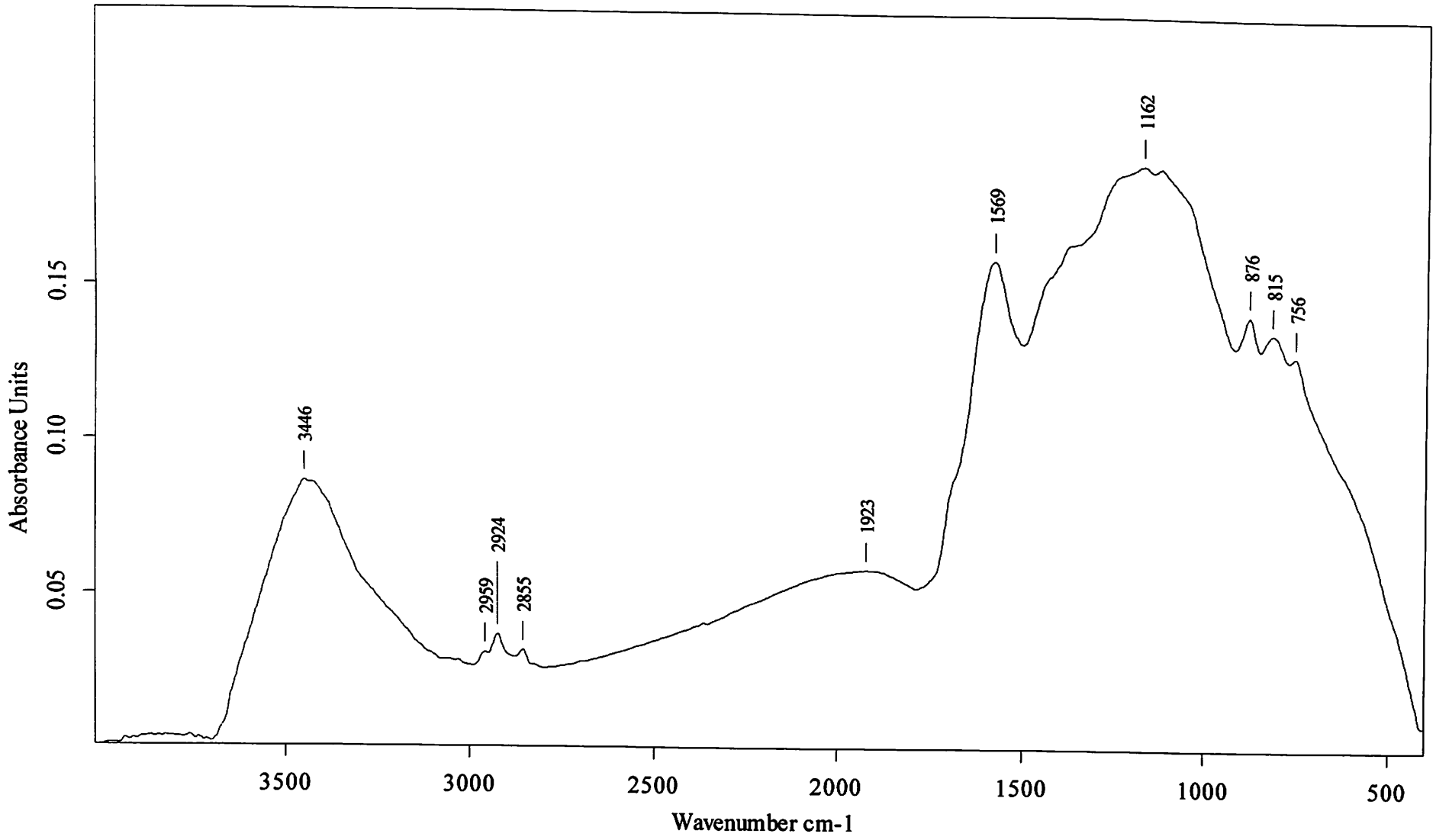
Date of Measurement : 16/07/2018	Sample Name : A04_rep 1
Operator Name : Administrator	Sample Form :
Instrument Type : TENSOR 27	Filename : A04_rep 1.0



Date of Measurement : 16/07/2018	Sample Name : A04_rep 2
Operator Name : Administrator	Sample Form :
Instrument Type : TENSOR 27	Filename : A04_rep 2.0



Date of Measurement : 16/07/2018	Sample Name : A05_rep 1
Operator Name : Administrator	Sample Form :
Instrument Type : TENSOR 27	Filename : A05_rep 1.0



Date of Measurement : 16/07/2018	Sample Name : A05_rep 2
Operator Name : Administrator	Sample Form :
Instrument Type : TENSOR 27	Filename : A05_rep 2.0