

Sample: FULL- N2@77K- ADS/DES

Operator:

Submitter:

File: D:\OneDrive - Zachodniopomorski Uniwersytet Technologiczny w  
Szczecinie\Doktorat\B...\GdcSi\_FULL.SMP

Started:	18.11.2022 14:39:39	Analysis adsorptive:	N2
Completed:	21.11.2022 18:42:54	Analysis bath temp.:	77,300 K
Report time:	22.11.2022 14:25:29	Thermal correction:	Yes
Sample mass:	1,0243 g	Ambient free space:	28,0000 cm <sup>3</sup> Entered
Analysis free space:	83,0000 cm <sup>3</sup>	Equilibration interval:	30 s
Low pressure dose:	0,02824 mmol/g	Sample density:	1,000 g/cm <sup>3</sup>
Automatic degas:	No		

## Summary Report

## Surface Area

BET Surface Area: 87,2200 m<sup>2</sup>/gt-Plot Micropore Area: 2,1108 m<sup>2</sup>/gt-Plot external surface area: 85,1091 m<sup>2</sup>/g

## DFT Pore Size

Volume in Pores	<	5,58 Å	0,00085 cm <sup>3</sup> /g
Total Volume in Pores	<=	203,97 Å	0,08523 cm <sup>3</sup> /g
Area in Pores	>	203,97 Å	0,793 m <sup>2</sup> /g
Total Area in Pores	>=	5,58 Å	72,890 m <sup>2</sup> /g

## Horvath-Kawazoe

Maximum pore volume at p/p° = 0,156442624: 0,035405 cm<sup>3</sup>/g

Median pore width: 11,855 Å

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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)
			05:02	101.6836209
0.000000604	0.0000614	0.02835	07:25	101.7741164
0.000001547	0.0001574	0.05659	09:32	101.7417541
0.000003720	0.0003781	0.08479	12:59	101.6554657
0.000008968	0.0009103	0.11292	15:25	101.5082528
0.000019055	0.0019314	0.14094	17:31	101.3618699
0.000035527	0.0035974	0.16877	19:06	101.2565319
0.000059830	0.0060539	0.19638	20:56	101.1835561
0.000094950	0.0096670	0.22367	23:02	101.8123538
0.000145430	0.0147915	0.25103	24:21	101.7085619
0.000214241	0.0217757	0.27841	25:54	101.6413229
0.000307897	0.0312831	0.30492	27:16	101.6025240
0.000431680	0.0438563	0.33028	28:35	101.5943948
0.000603940	0.0613264	0.35613	29:58	101.5439676
0.000829048	0.0841715	0.38130	31:32	101.5280021
0.001148264	0.1165710	0.40797	32:14	101.5193115
0.001564393	0.1587786	0.43385	32:44	101.4953632
0.002092494	0.2123221	0.45918	33:30	101.4684693
0.002771404	0.2811492	0.48446	34:01	101.4464740
0.003609142	0.3659543	0.50894	34:33	101.3964700
0.004607928	0.4673122	0.53238	35:25	101.4148197
0.005733747	0.5812363	0.55402	36:28	101.3711140
0.007162701	0.7259355	0.57657	37:07	101.3494035
0.008809702	0.8927285	0.59820	37:50	101.3346912
0.010707833	1.0875184	0.62064	68:48	101.5628788
0.058763964	5.9655045	0.83491	69:00	101.5163739
0.116524490	11.8287520	0.95429	69:12	101.5130131
0.156442624	15.8809405	1.02120	69:23	101.5128748
0.205647519	20.8745455	1.10076	69:34	101.5064300
0.254942889	25.8783425	1.18534	69:45	101.5064300
0.303805096	30.8343834	1.28022	69:57	101.4939636
0.359600263	36.4825957	1.40362	70:13	101.4531955
0.403910888	40.9816164	1.50868	70:27	101.4620245
0.457827344	46.4452268	1.64897	70:43	101.4470355
0.507512748	51.4825375	1.79534	71:00	101.4408755
0.557889829	56.5821234	1.95963	71:18	101.4216795
0.608077133	61.6660733	2.13314	71:37	101.4115973
0.660634174	66.9900427	2.30369	71:57	101.4026299
0.704561427	71.4460615	2.41424	72:10	101.4050142
0.757193844	76.7654332	2.48427	72:21	101.3814810
0.804920480	81.5963603	2.50744	72:30	101.3719521

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Low pressure dose:	0,02824 mmol/g	Sample density:	1,000 g/cm <sup>3</sup>
Automatic degas:	No		

## Isotherm Tabular Report

Relative Pressure (p/p°)	Absolute Pressure (kPa)	Quantity Adsorbed (mmol/g)	Elapsed Time (h:min)	Saturation Pressure (kPa)
0.874286679	88.6317046	2.52180	72:38	101.3760208
0.924771713	93.7597753	2.53496	72:45	101.3869411
0.956602532	96.9671782	2.55458	72:54	101.3662153
0.993636647	100.7012796	2.71966	73:21	101.3461811
0.891169733	90.3117833	2.53234	73:33	101.3407210
0.780706256	79.0957923	2.52006	73:41	101.3131272
0.681239923	69.0234086	2.50378	73:51	101.3202636
0.593408777	60.1027250	2.46175	74:05	101.2838490
0.498982132	50.5281358	2.15488	74:35	101.2624152
0.390729615	39.5566479	1.47922	75:00	101.2379055
0.299147347	30.2815723	1.27248	75:14	101.2262772
0.189042493	19.1401459	1.07541	75:27	101.2478493
0.137542736	13.9238256	0.99191	75:39	101.2327220

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Operator:

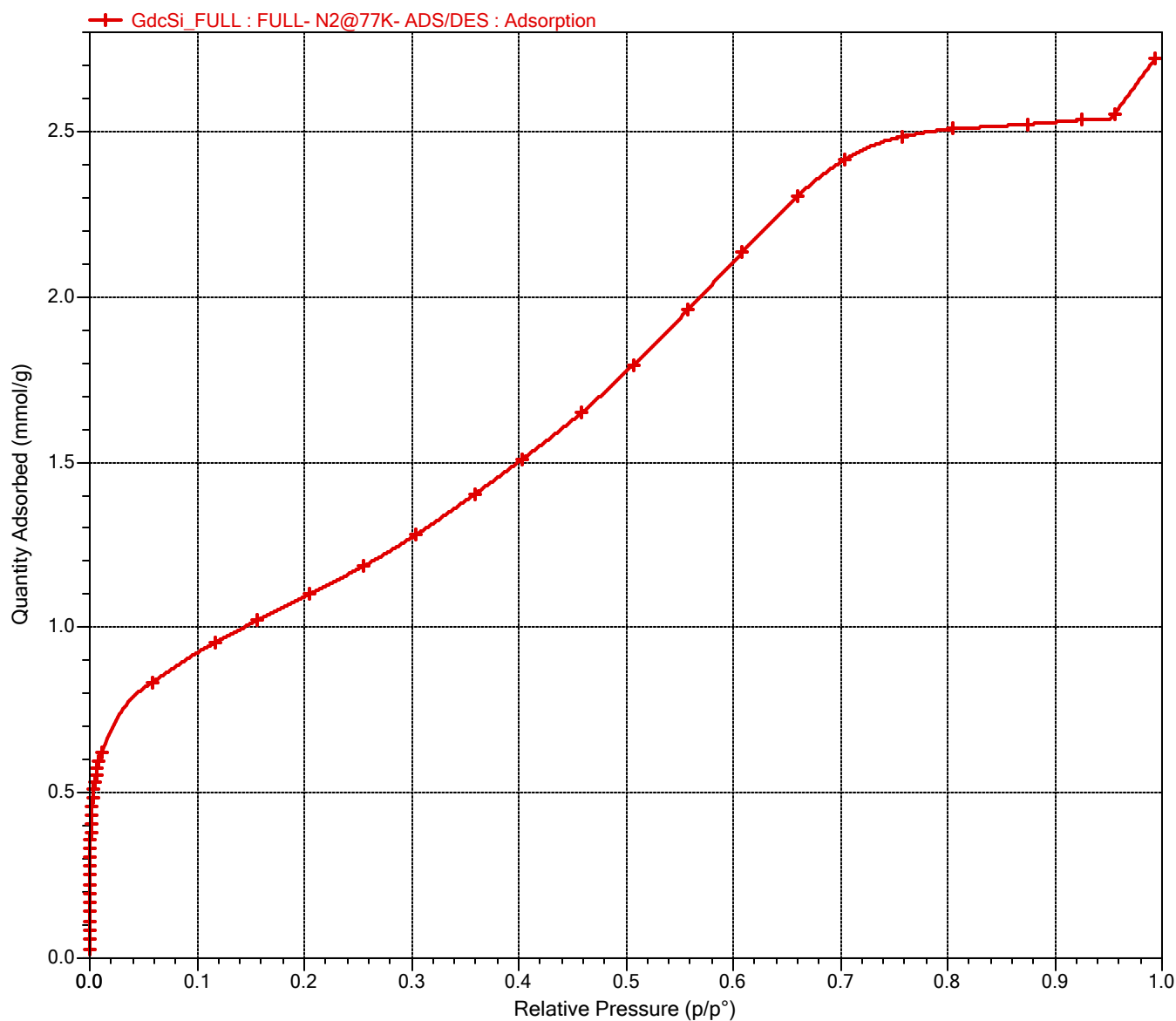
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Low pressure dose: 0,02824 mmol/g  
Automatic degas: No

Analysis adsorptive: N2  
Analysis bath temp.: 77,300 K  
Thermal correction: Yes  
Ambient free space: 28,0000 cm<sup>3</sup> Entered  
Equilibration interval: 30 s  
Sample density: 1,000 g/cm<sup>3</sup>

Isotherm Linear Plot



Sample: FULL- N2@77K- ADS/DES

Operator:

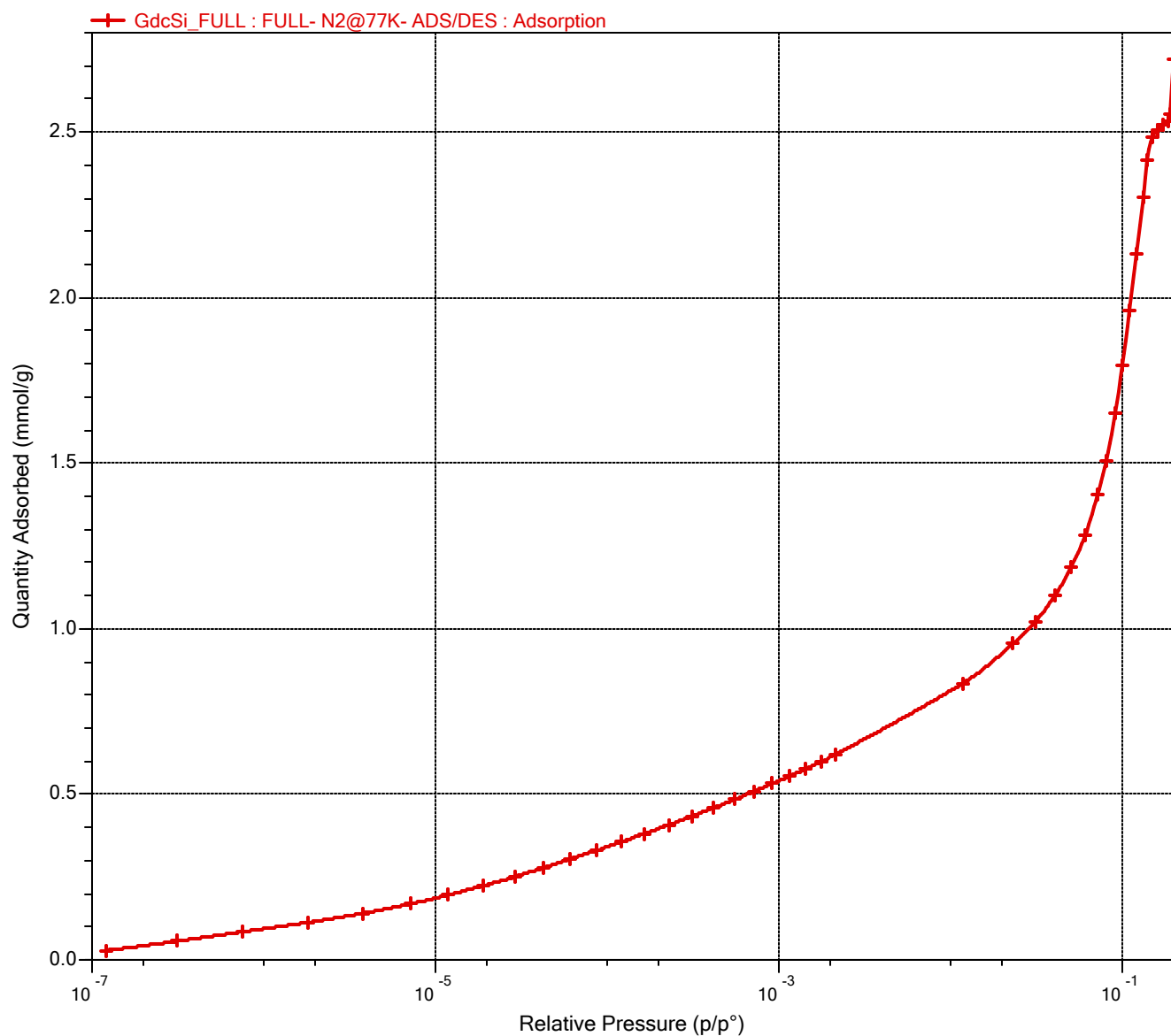
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Low pressure dose: 0,02824 mmol/g  
Automatic degas: No

Analysis adsorptive: N2  
Analysis bath temp.: 77,300 K  
Thermal correction: Yes  
Ambient free space: 28,0000 cm<sup>3</sup> Entered  
Equilibration interval: 30 s  
Sample density: 1,000 g/cm<sup>3</sup>

Isotherm Log Plot



Sample: FULL- N2@77K- ADS/DES

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Analysis free space:	83,0000 cm <sup>3</sup>	Equilibration interval:	30 s
Low pressure dose:	0,02824 mmol/g	Sample density:	1,000 g/cm <sup>3</sup>
Automatic degas:	No		

## BET Report

BET surface area: 87,2200 ± 0,3347 m<sup>2</sup>/g  
 Slope: 1,11628 ± 0,00426 g/mmol  
 Y-intercept: 0,00226 ± 0,00055 g/mmol  
 C: 495,085937  
 Qm: 0,89402 mmol/g  
 Correlation coefficient: 0,9997819  
 Molecular cross-sectional area: 0,1620 nm<sup>2</sup>

Relative Pressure (p/p°)	Quantity Adsorbed (mmol/g)	1/[Q(p°/p - 1)]
0.000000604	0.02835	0.00002
0.000001547	0.05659	0.00003
0.000003720	0.08479	0.00004
0.000008968	0.11292	0.00008
0.000019055	0.14094	0.00014
0.000035527	0.16877	0.00021
0.000059830	0.19638	0.00030
0.000094950	0.22367	0.00042
0.000145430	0.25103	0.00058
0.000214241	0.27841	0.00077
0.000307897	0.30492	0.00101
0.000431680	0.33028	0.00131
0.000603940	0.35613	0.00170
0.000829048	0.38130	0.00218
0.001148264	0.40797	0.00282
0.001564393	0.43385	0.00361
0.002092494	0.45918	0.00457
0.002771404	0.48446	0.00574
0.003609142	0.50894	0.00712
0.004607928	0.53238	0.00870
0.005733747	0.55402	0.01041
0.007162701	0.57657	0.01251
0.008809702	0.59820	0.01486
0.010707833	0.62064	0.01744
0.058763964	0.83491	0.07478
0.116524490	0.95429	0.13821
0.156442624	1.02120	0.18161
0.205647519	1.10076	0.23519
0.254942889	1.18534	0.28868
0.303805096	1.28022	0.34086
0.359600263	1.40362	0.40006
0.403910888	1.50868	0.44914

Sample: FULL- N2@77K- ADS/DES

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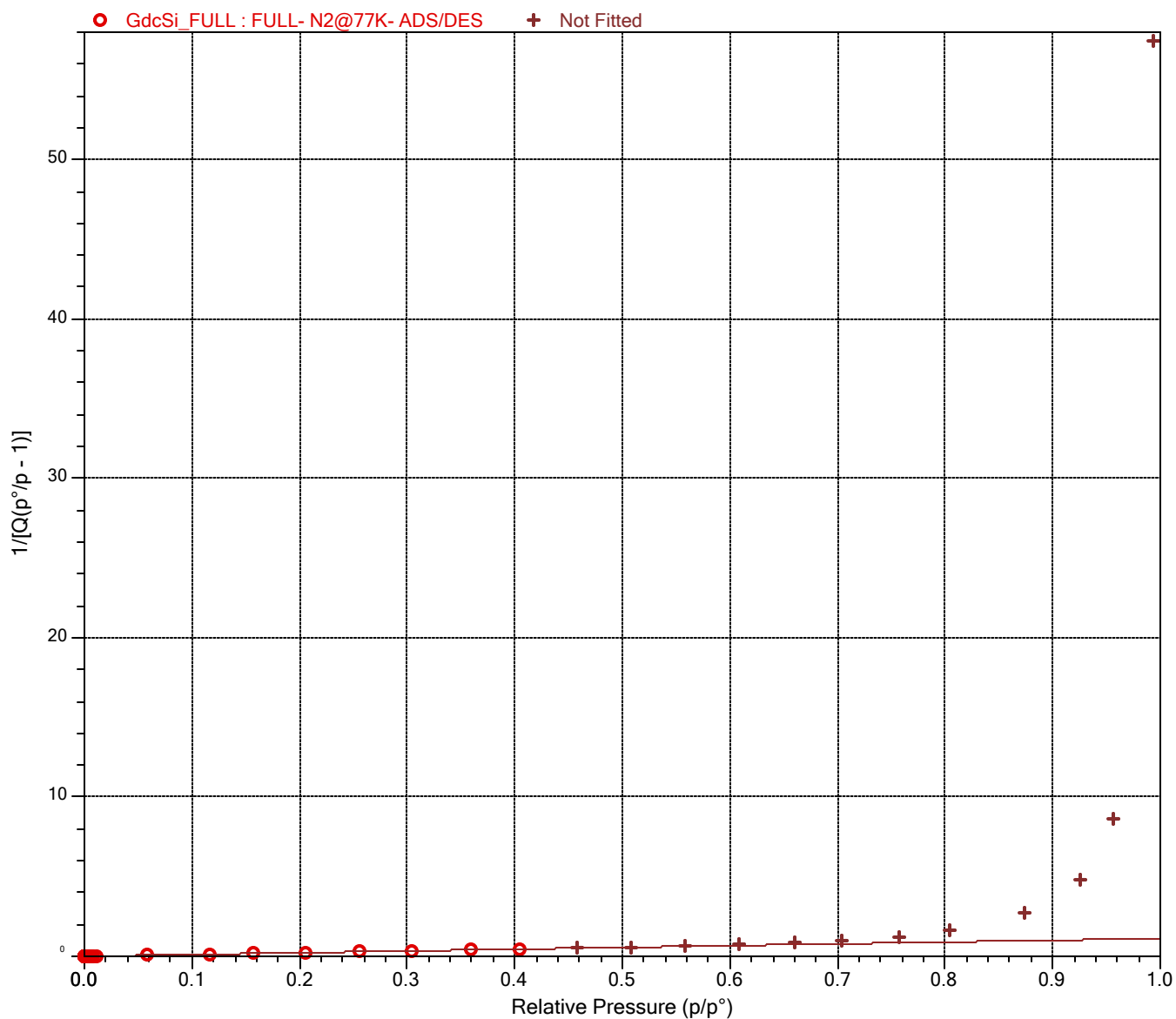
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Automatic degas: No

Analysis adsorptive: N2  
Analysis bath temp.: 77,300 K  
Thermal correction: Yes  
Ambient free space: 28,0000 cm<sup>3</sup> Entered  
Equilibration interval: 30 s  
Sample density: 1,000 g/cm<sup>3</sup>

### BET Surface Area Plot



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Analysis free space:	83,0000 cm <sup>3</sup>	Equilibration interval:	30 s
Low pressure dose:	0,02824 mmol/g	Sample density:	1,000 g/cm <sup>3</sup>
Automatic degas:	No		

## t-Plot Report

Micropore volume:	0,001236 cm <sup>3</sup> /g
Micropore area:	2,1108 m <sup>2</sup> /g
External surface area:	85,1091 m <sup>2</sup> /g
Slope:	0,245483 ± 0,001662 mmol/g·Å
Y-intercept:	0,035636 ± 0,006997 mmol/g
Correlation coefficient:	0,999954
Surface area correction factor:	1,000
Density conversion factor:	0,0015468
Total surface area (BET):	87,2200 m <sup>2</sup> /g
Thickness range:	3,5000 to 5,0000 Å
Thickness equation:	Carbon Black STSA

## Thickness Curve

$$t = 2.98 + 6.45 (p/p^\circ) + 0.88 (p/p^\circ)^2$$

## t-Plot Report - Data

Relative Pressure (p/p°)	Statistical Thickness (Å)	Quantity Adsorbed (mmol/g)	Fitted
0.058763964	3.3621	0.83491	
0.116524490	3.7435	0.95429	
0.156442624	4.0106	1.02120	
0.205647519	4.3436	1.10076	
0.254942889	4.6816	1.18534	
0.303805096	5.0208	1.28022	
0.359600263	5.4132	1.40362	
0.403910888	5.7288	1.50868	
0.457827344	6.1174	1.64897	
0.507512748	6.4801	1.79534	
0.557889829	6.8523	1.95963	
0.608077133	7.2275	2.13314	
0.660634174	7.6252	2.30369	



Sample: FULL- N2@77K- ADS/DES

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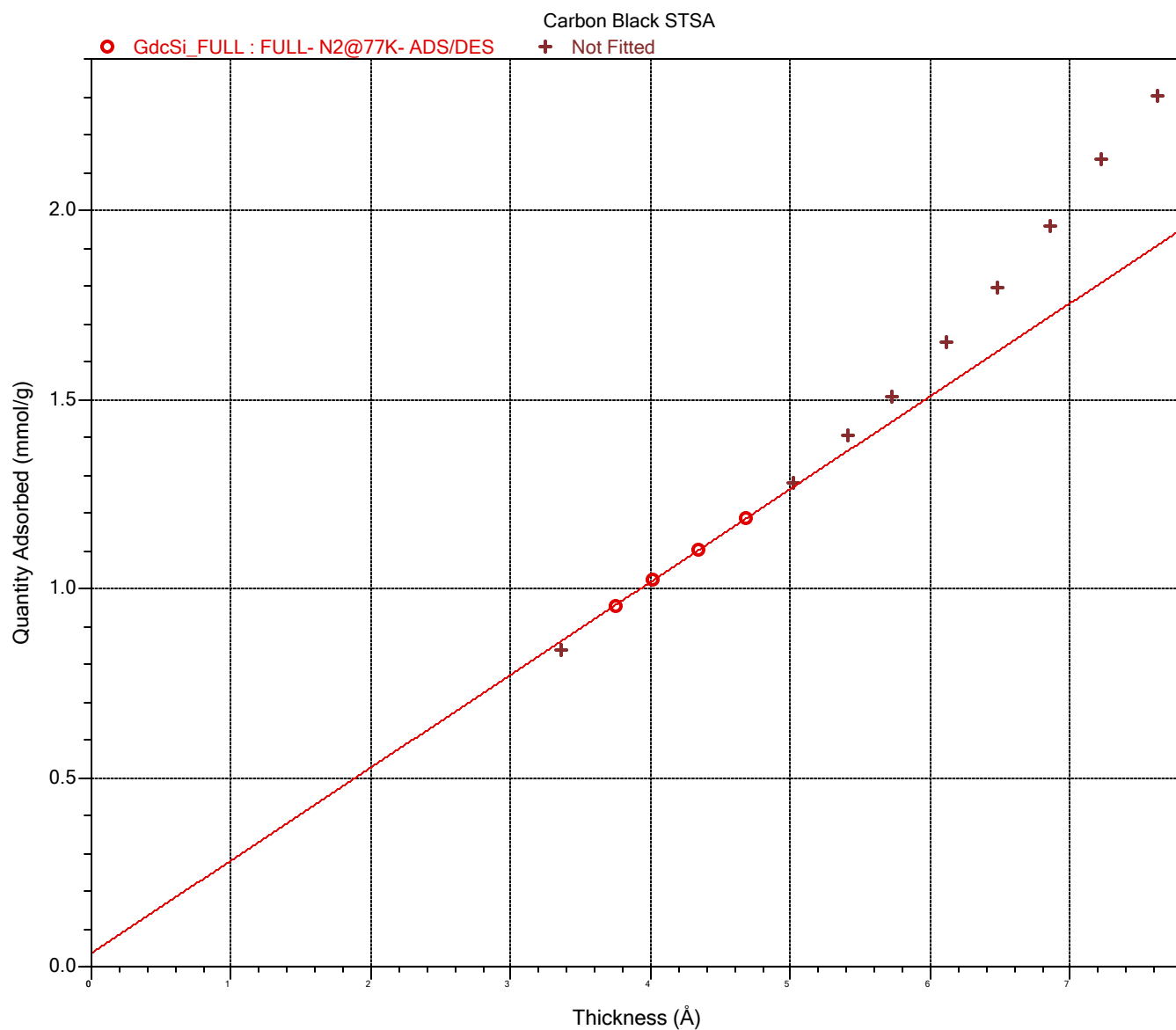
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Automatic degas: No

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Thermal correction: Yes  
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Equilibration interval: 30 s  
Sample density: 1,000 g/cm<sup>3</sup>

### t-Plot



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Low pressure dose:	0,02824 mmol/g	Sample density:	1,000 g/cm <sup>3</sup>
Automatic degas:	No		

## Horvath-Kawazoe Report

## Cylinder Pore Geometry (Saito-Foley)

Maximum pore volume: 0,035405 cm<sup>3</sup>/g  
 at Relative Pressure: 0,156442624  
 Median pore width: 11,855 Å  
 Relative pressure range: 1e-09 to 0.18

Diameter of adsorptive molecule: 3,000 Å  
 Adsorptive density: 6.710e+14 molecules/cm<sup>2</sup>  
 Adsorptive dispersion constant: 7.777e-59  
 Diameter of sample atom: 3,400 Å  
 Sample Density: 3.845e+15 molecules/cm<sup>2</sup>  
 Sample dispersion constant: 6.036e-59

Density conversion factor: 0,0015468

Absolute Pressure (kPa)	Relative Pressure (p/p°)	Quantity Adsorbed (mmol/g)	Pore Width (Å)	Cumulative Pore Volume (cm <sup>3</sup> /g)	Smoothed Differential Pore Volume (cm <sup>3</sup> /g·Å)
0.00006	0.000000604	0.02835	5.975	0.0010	0.0033
0.00016	0.000001547	0.05659	6.275	0.0020	0.0032
0.00038	0.000003720	0.08479	6.588	0.0029	0.0030
0.00091	0.000008968	0.11292	6.940	0.0039	0.0028
0.00193	0.000019055	0.14094	7.282	0.0049	0.0029
0.00360	0.000035527	0.16877	7.597	0.0059	0.0032
0.00605	0.000059830	0.19638	7.887	0.0068	0.0033
0.00967	0.000094950	0.22367	8.169	0.0078	0.0033
0.01479	0.000145430	0.25103	8.453	0.0087	0.0034
0.02178	0.000214241	0.27841	8.734	0.0097	0.0033
0.03128	0.000307897	0.30492	9.018	0.0106	0.0032
0.04386	0.000431680	0.33028	9.303	0.0115	0.0030
0.06133	0.000603940	0.35613	9.613	0.0123	0.0028
0.08417	0.000829048	0.38130	9.929	0.0132	0.0027
0.11657	0.001148264	0.40797	10.283	0.0141	0.0025
0.15878	0.001564393	0.43385	10.648	0.0150	0.0024
0.21232	0.002092494	0.45918	11.024	0.0159	0.0023
0.28115	0.002771404	0.48446	11.420	0.0168	0.0022
0.36595	0.003609142	0.50894	11.826	0.0176	0.0020
0.46731	0.004607928	0.53238	12.234	0.0185	0.0019
0.58124	0.005733747	0.55402	12.631	0.0192	0.0018
0.72594	0.007162701	0.57657	13.070	0.0200	0.0017
0.89273	0.008809702	0.59820	13.513	0.0207	0.0017
1.08752	0.010707833	0.62064	13.965	0.0215	0.0016

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Low pressure dose:	0,02824 mmol/g	Sample density:	1,000 g/cm <sup>3</sup>
Automatic degas:	No		

Absolute Pressure (kPa)	Relative Pressure (p/p°)	Quantity Adsorbed (mmol/g)	Pore Width (Å)	Cumulative Pore Volume (cm <sup>3</sup> /g)	Smoothed Differential Pore Volume (cm <sup>3</sup> /g·Å)
5.96550	0.058763964	0.83491	20.438	0.0289	0.0009
11.82875	0.116524490	0.95429	25.826	0.0331	0.0007
15.88094	0.156442624	1.02120	29.362	0.0354	0.0006

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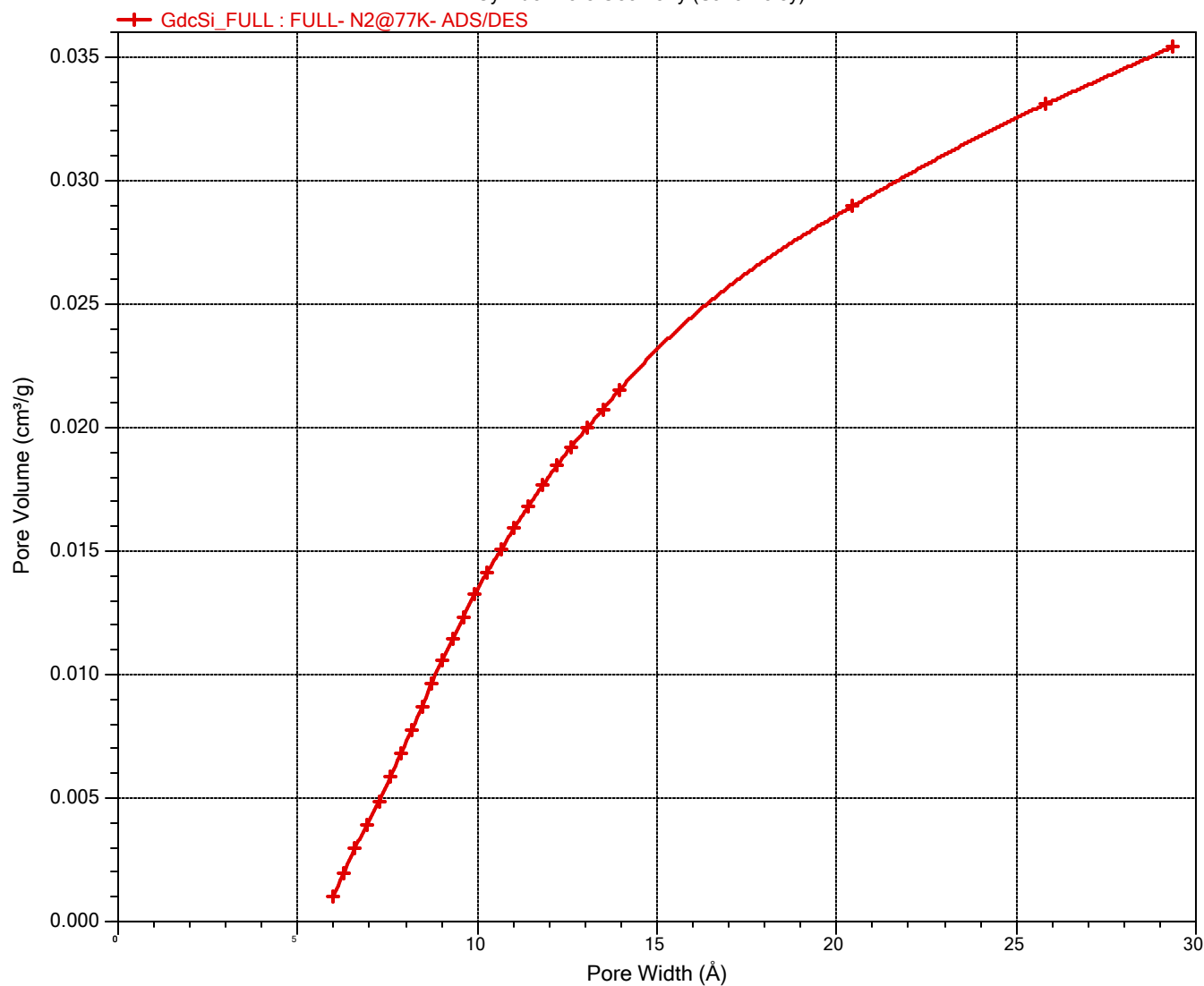
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Automatic degas: No

Analysis adsorptive: N2  
Analysis bath temp.: 77,300 K  
Thermal correction: Yes  
Ambient free space: 28,0000 cm<sup>3</sup> Entered  
Equilibration interval: 30 s  
Sample density: 1,000 g/cm<sup>3</sup>

### Horvath-Kawazoe Cumulative Pore Volume Plot

Cylinder Pore Geometry (Saito-Foley)



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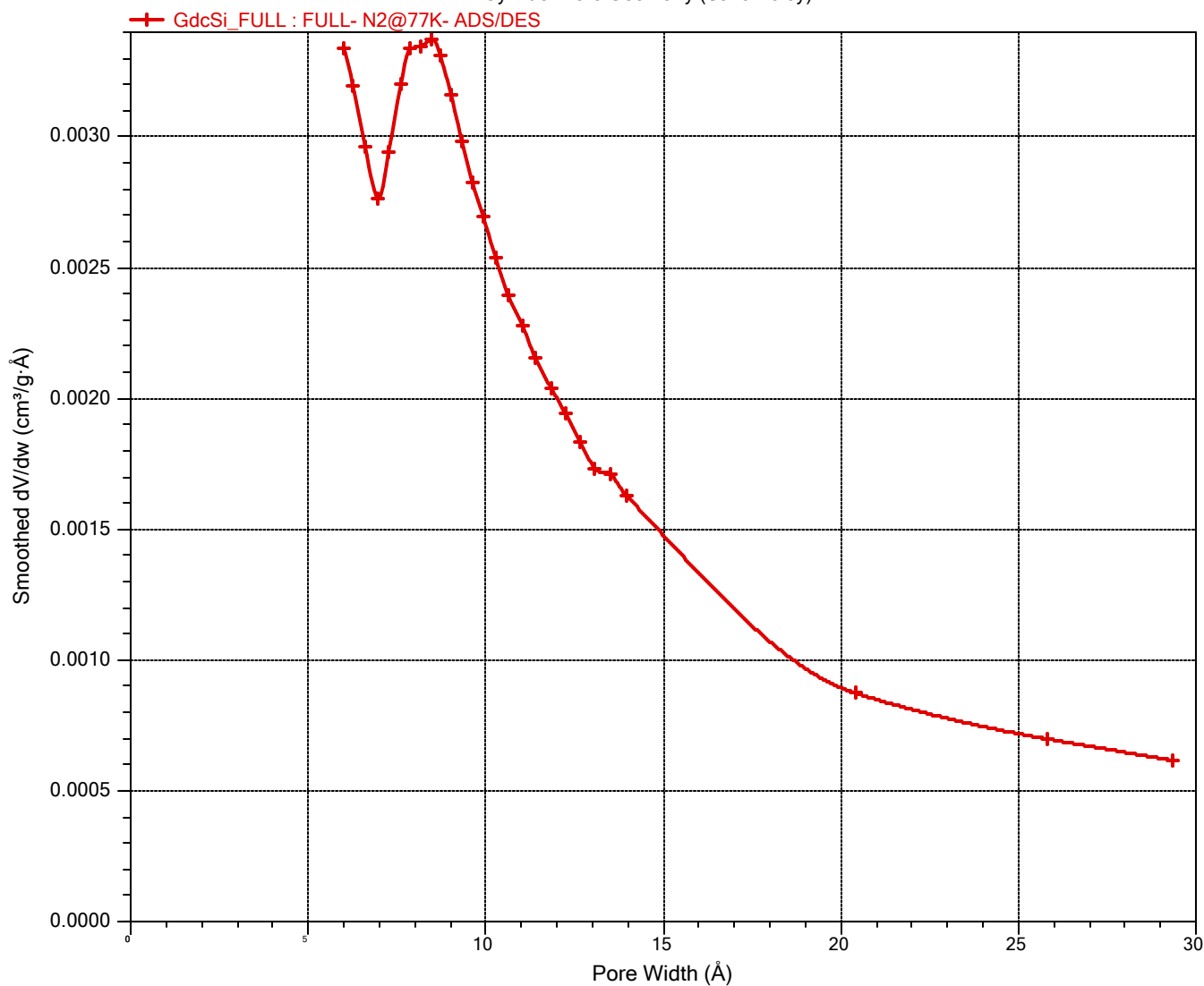
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Analysis free space:	83,0000 cm <sup>3</sup>	Equilibration interval:	30 s
Low pressure dose:	0,02824 mmol/g	Sample density:	1,000 g/cm <sup>3</sup>
Automatic degas:	No		

### Horvath-Kawazoe Differential Pore Volume Plot

Cylinder Pore Geometry (Saito-Foley)



Sample: FULL- N2@77K- ADS/DES

Operator:

Submitter:

File: D:\OneDrive - Zachodniopomorski Uniwersytet Technologiczny w  
Szczecinie\Doktorat\B...\GdcSi\_FULL.SMP

Started:	18.11.2022 14:39:39	Analysis adsorptive:	N2
Completed:	21.11.2022 18:42:54	Analysis bath temp.:	77,300 K
Report time:	22.11.2022 14:25:29	Thermal correction:	Yes
Sample mass:	1,0243 g	Ambient free space:	28,0000 cm <sup>3</sup> Entered
Analysis free space:	83,0000 cm <sup>3</sup>	Equilibration interval:	30 s
Low pressure dose:	0,02824 mmol/g	Sample density:	1,000 g/cm <sup>3</sup>
Automatic degas:	No		

Porosity Distribution by  
Model: N2 - Cylindrical Pores - Oxide Surface  
Method: Non-negative Regularization: 0,01000  
Standard Deviation of Fit: 0,006425 mmol/g

Volume in Pores	<	5,58 Å	0,00085 cm <sup>3</sup> /g
Total Volume in Pores	<=	203,97 Å	0,08523 cm <sup>3</sup> /g
Area in Pores	>	203,97 Å	0,793 m <sup>2</sup> /g
Total Area in Pores	>=	5,58 Å	72,890 m <sup>2</sup> /g

Pore Table				
Pore Width (Å)	Cumulative Pore Volume (cm <sup>3</sup> /g)	Incremental Pore Volume (cm <sup>3</sup> /g)	Cumulative Pore Area (m <sup>2</sup> /g)	Incremental Pore Area (m <sup>2</sup> /g)
5.58	0.00085	0.00000	0.000	0.000
5.93	0.00085	0.00000	0.000	0.000
6.29	0.00085	0.00000	0.000	0.000
6.65	0.00085	0.00000	0.000	0.000
7.01	0.00085	0.00000	0.000	0.000
7.36	0.00085	0.00000	0.000	0.000
7.72	0.00085	0.00000	0.000	0.000
8.08	0.00085	0.00000	0.000	0.000
8.44	0.00085	0.00000	0.000	0.000
8.79	0.00085	0.00000	0.000	0.000
9.15	0.00085	0.00000	0.000	0.000
9.51	0.00085	0.00000	0.000	0.000
9.87	0.00085	0.00000	0.000	0.000
10.22	0.00085	0.00000	0.000	0.000
10.58	0.00085	0.00000	0.000	0.000
10.94	0.00085	0.00000	0.000	0.000
11.30	0.00085	0.00000	0.000	0.000
11.65	0.00085	0.00000	0.000	0.000
12.01	0.00085	0.00000	0.000	0.000
12.37	0.00085	0.00000	0.000	0.000
12.73	0.00085	0.00000	0.000	0.000
13.08	0.00085	0.00000	0.000	0.000
13.44	0.00085	0.00000	0.000	0.000
13.80	0.00085	0.00000	0.000	0.000
14.16	0.00085	0.00000	0.000	0.000
14.51	0.00085	0.00000	0.000	0.000
14.87	0.00085	0.00000	0.000	0.000
15.23	0.00115	0.00029	0.768	0.768
15.59	0.00198	0.00083	2.900	2.132
15.94	0.00304	0.00106	5.562	2.662
16.30	0.00379	0.00076	7.415	1.854

Sample: FULL- N2@77K- ADS/DES

Operator:

Submitter:

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Analysis free space:	83,0000 cm <sup>3</sup>	Equilibration interval:	30 s
Low pressure dose:	0,02824 mmol/g	Sample density:	1,000 g/cm <sup>3</sup>
Automatic degas:	No		

Pore Width (Å)	Cumulative Pore Volume (cm <sup>3</sup> /g)	Pore Table		
		Incremental Pore Volume (cm <sup>3</sup> /g)	Cumulative Pore Area (m <sup>2</sup> /g)	Incremental Pore Area (m <sup>2</sup> /g)
16.66	0.00403	0.00024	7.995	0.580
17.02	0.00403	0.00000	7.995	0.000
17.37	0.00403	0.00000	7.995	0.000
17.73	0.00403	0.00000	7.995	0.000
18.09	0.00403	0.00000	7.995	0.000
18.44	0.00403	0.00000	7.995	0.000
18.80	0.00403	0.00000	7.995	0.000
19.16	0.00403	0.00000	7.995	0.000
19.52	0.00403	0.00000	7.995	0.000
19.87	0.00403	0.00000	7.995	0.000
20.23	0.00403	0.00000	7.995	0.000
20.59	0.00403	0.00000	7.995	0.000
20.95	0.00403	0.00000	7.995	0.000
21.30	0.00403	0.00000	7.995	0.000
21.66	0.00403	0.00000	7.995	0.000
22.38	0.00439	0.00036	8.636	0.641
23.09	0.00506	0.00067	9.794	1.158
23.81	0.00558	0.00052	10.671	0.877
24.52	0.00581	0.00023	11.048	0.377
25.24	0.00588	0.00007	11.151	0.103
25.95	0.00588	0.00000	11.151	0.000
26.67	0.00588	0.00000	11.151	0.000
27.38	0.00605	0.00017	11.394	0.244
28.10	0.00628	0.00024	11.733	0.338
28.81	0.00644	0.00015	11.947	0.214
29.53	0.00673	0.00029	12.346	0.399
30.24	0.00734	0.00061	13.154	0.808
30.96	0.00811	0.00076	14.141	0.986
31.67	0.00859	0.00048	14.752	0.611
32.39	0.00922	0.00063	15.531	0.779
33.10	0.01035	0.00113	16.891	1.360
33.82	0.01127	0.00093	17.987	1.096
34.53	0.01191	0.00063	18.721	0.734
35.25	0.01252	0.00061	19.412	0.692
35.96	0.01374	0.00123	20.775	1.363
36.68	0.01570	0.00195	22.907	2.131
37.39	0.01706	0.00137	24.371	1.464
38.11	0.01799	0.00093	25.346	0.976
38.82	0.01906	0.00107	26.447	1.101
39.54	0.02031	0.00125	27.709	1.262
40.25	0.02153	0.00122	28.921	1.211

Sample: FULL- N2@77K- ADS/DES

Operator:

Submitter:

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Analysis free space:	83,0000 cm <sup>3</sup>	Equilibration interval:	30 s
Low pressure dose:	0,02824 mmol/g	Sample density:	1,000 g/cm <sup>3</sup>
Automatic degas:	No		

Pore Width (Å)	Cumulative Pore Volume (cm <sup>3</sup> /g)	Pore Table		
		Incremental Pore Volume (cm <sup>3</sup> /g)	Cumulative Pore Area (m <sup>2</sup> /g)	Incremental Pore Area (m <sup>2</sup> /g)
40.96	0.02272	0.00120	30.088	1.168
41.68	0.02395	0.00122	31.260	1.172
42.39	0.02521	0.00127	32.458	1.198
43.11	0.02649	0.00127	33.639	1.182
43.82	0.02778	0.00129	34.815	1.176
44.54	0.02909	0.00131	35.994	1.179
45.25	0.03046	0.00137	37.204	1.210
45.97	0.03186	0.00140	38.423	1.219
46.68	0.03327	0.00141	39.631	1.208
47.40	0.03457	0.00130	40.730	1.099
48.11	0.03555	0.00098	41.547	0.818
48.83	0.03615	0.00060	42.039	0.492
49.54	0.03684	0.00068	42.589	0.550
50.26	0.03915	0.00231	44.427	1.838
52.05	0.04384	0.00469	48.034	3.607
54.91	0.04869	0.00485	51.570	3.536
57.77	0.05199	0.00330	53.853	2.283
60.98	0.05677	0.00478	56.987	3.134
64.20	0.06160	0.00483	59.996	3.009
67.42	0.06615	0.00455	62.698	2.702
70.99	0.07034	0.00419	65.060	2.362
74.57	0.07293	0.00258	66.446	1.386
78.50	0.07641	0.00349	68.223	1.776
82.79	0.07931	0.00290	69.622	1.399
87.08	0.08079	0.00149	70.304	0.682
91.37	0.08200	0.00121	70.833	0.529
96.37	0.08335	0.00135	71.392	0.559
101.38	0.08429	0.00094	71.762	0.370
106.38	0.08466	0.00037	71.901	0.138
112.10	0.08487	0.00022	71.979	0.078
117.82	0.08512	0.00025	72.063	0.084
123.90	0.08523	0.00011	72.097	0.034
130.33	0.08523	0.00000	72.097	0.000
136.76	0.08523	0.00000	72.097	0.000
143.91	0.08523	0.00000	72.097	0.000
151.06	0.08523	0.00000	72.097	0.000
158.93	0.08523	0.00000	72.097	0.000
167.15	0.08523	0.00000	72.097	0.000
175.73	0.08523	0.00000	72.097	0.000
184.66	0.08523	0.00000	72.097	0.000
193.96	0.08523	0.00000	72.097	0.000



Sample: FULL- N2@77K- ADS/DES

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Low pressure dose:	0,02824 mmol/g	Sample density:	1,000 g/cm <sup>3</sup>
Automatic degas:	No		

Pore Table				
Pore Width (Å)	Cumulative Pore Volume (cm <sup>3</sup> /g)	Incremental Pore Volume (cm <sup>3</sup> /g)	Cumulative Pore Area (m <sup>2</sup> /g)	Incremental Pore Area (m <sup>2</sup> /g)
203.97	0.08523	0.00000	72.097	0.000

Sample: FULL- N2@77K- ADS/DES

Operator:

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Low pressure dose:	0,02824 mmol/g	Sample density:	1,000 g/cm <sup>3</sup>
Automatic degas:	No		

Porosity Distribution by  
Model: N2 - Cylindrical Pores - Oxide Surface  
Method: Non-negative Regularization: 0,01000  
Standard Deviation of Fit: 0,006425 mmol/g

Isotherm Table				
Relative Pressure (p/p°)	Experimental Quantity Adsorbed (mmol/g)	Fitted Quantity Adsorbed (mmol/g)	Absolute Residual (mmol/g)	Relative Residual
0.000000631	0.02940	0.03895	-0.00955	-0.324785
0.000000794	0.03545	0.04066	-0.00521	-0.146934
0.000001000	0.04248	0.04268	-0.00020	-0.004661
0.000001259	0.05012	0.04516	0.00496	0.098885
0.000001585	0.05728	0.04835	0.00893	0.155965
0.000001995	0.06438	0.05262	0.01176	0.182694
0.000002512	0.07226	0.05853	0.01373	0.189973
0.000003162	0.08015	0.06653	0.01362	0.169917
0.000003981	0.08645	0.07600	0.01045	0.120919
0.000005012	0.09299	0.08584	0.00715	0.076889
0.000006310	0.10080	0.09565	0.00515	0.051137
0.000007943	0.10909	0.10521	0.00387	0.035494
0.000010000	0.11614	0.11475	0.00139	0.011959
0.000012589	0.12421	0.12455	-0.00035	-0.002809
0.000015849	0.13360	0.13486	-0.00127	-0.009469
0.000019953	0.14263	0.14558	-0.00295	-0.020674
0.000025119	0.15224	0.15674	-0.00449	-0.029524
0.000031623	0.16326	0.16828	-0.00502	-0.030749
0.000039811	0.17419	0.18028	-0.00609	-0.034934
0.000050119	0.18655	0.19275	-0.00620	-0.033229
0.000063096	0.19925	0.20574	-0.00648	-0.032542
0.000079433	0.21283	0.21920	-0.00637	-0.029917
0.000100000	0.22673	0.23310	-0.00637	-0.028084
0.000125892	0.24146	0.24746	-0.00600	-0.024846
0.000158490	0.25678	0.26231	-0.00553	-0.021528
0.000199526	0.27335	0.27771	-0.00436	-0.015947
0.000251188	0.28989	0.29360	-0.00371	-0.012803
0.000316228	0.30683	0.31003	-0.00319	-0.010409
0.000398107	0.32422	0.32685	-0.00263	-0.008105
0.000501187	0.34158	0.34415	-0.00257	-0.007521
0.000630958	0.35948	0.36182	-0.00234	-0.006507
0.000794328	0.37793	0.37996	-0.00203	-0.005367
0.001000000	0.39656	0.39850	-0.00194	-0.004884
0.001258925	0.41548	0.41752	-0.00204	-0.004917
0.001584895	0.43492	0.43698	-0.00206	-0.004726

Sample: FULL- N2@77K- ADS/DES

Operator:

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Analysis free space:	83,0000 cm <sup>3</sup>	Equilibration interval:	30 s
Low pressure dose:	0,02824 mmol/g	Sample density:	1,000 g/cm <sup>3</sup>
Automatic degas:	No		

Isotherm Table

Relative Pressure (p/p°)	Experimental Quantity Adsorbed (mmol/g)	Fitted Quantity Adsorbed (mmol/g)	Absolute Residual (mmol/g)	Relative Residual
0.001995263	0.45503	0.45693	-0.00190	-0.004182
0.002511882	0.47555	0.47736	-0.00181	-0.003797
0.003162276	0.49656	0.49828	-0.00173	-0.003475
0.003981066	0.51819	0.51972	-0.00153	-0.002956
0.005011868	0.54060	0.54171	-0.00110	-0.002041
0.006309579	0.56365	0.56439	-0.00074	-0.001316
0.007943276	0.58705	0.58787	-0.00082	-0.001405
0.010000000	0.61316	0.61227	0.00089	0.001445
0.012355640	0.63542	0.63533	0.00009	0.000138
0.015186320	0.65898	0.65909	-0.00011	-0.000162
0.018485530	0.68370	0.68255	0.00115	0.001677
0.022294740	0.70885	0.70535	0.00350	0.004943
0.026653420	0.73362	0.72725	0.00638	0.008695
0.031598160	0.75719	0.74905	0.00814	0.010754
0.037162240	0.77888	0.77050	0.00838	0.010762
0.043374470	0.79837	0.79197	0.00641	0.008028
0.050259210	0.81596	0.81337	0.00260	0.003182
0.057835260	0.83288	0.83431	-0.00143	-0.001719
0.066115920	0.85109	0.85482	-0.00373	-0.004382
0.075109080	0.87097	0.87480	-0.00384	-0.004404
0.084815920	0.89216	0.89418	-0.00203	-0.002272
0.095232370	0.91411	0.91418	-0.00007	-0.000072
0.106348200	0.93607	0.93532	0.00074	0.000793
0.118147500	0.95703	0.95659	0.00043	0.000453
0.130609100	0.97811	0.97807	0.00004	0.000042
0.143706600	1.00016	1.00018	-0.00002	-0.000025
0.157410500	1.02278	1.02254	0.00024	0.000234
0.171685500	1.04587	1.04581	0.00006	0.000054
0.186492100	1.06969	1.06944	0.00025	0.000237
0.201792100	1.09446	1.09449	-0.00003	-0.000026
0.217539500	1.12049	1.12060	-0.00011	-0.000094
0.233689500	1.14804	1.14764	0.00040	0.000348
0.250196100	1.17692	1.17726	-0.00034	-0.000288
0.267011800	1.20728	1.20701	0.00028	0.000228
0.284089500	1.24004	1.23992	0.00012	0.000095
0.301380300	1.27514	1.27548	-0.00034	-0.000267
0.318838200	1.31232	1.31193	0.00039	0.000295
0.336417100	1.35104	1.35112	-0.00009	-0.000066
0.354071100	1.39095	1.39090	0.00005	0.000037
0.371757900	1.43180	1.43179	0.00001	0.000006

Sample: FULL- N2@77K- ADS/DES

Operator:

Submitter:

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Low pressure dose:	0,02824 mmol/g	Sample density:	1,000 g/cm <sup>3</sup>
Automatic degas:	No		

Isotherm Table

Relative Pressure (p/p°)	Experimental Quantity Adsorbed (mmol/g)	Fitted Quantity Adsorbed (mmol/g)	Absolute Residual (mmol/g)	Relative Residual
0.389435500	1.47364	1.47363	0.00002	0.000012
0.407065800	1.51642	1.51641	0.00001	0.000008
0.424610500	1.56059	1.56057	0.00001	0.000009
0.442034200	1.60621	1.60622	-0.00001	-0.000004
0.459305300	1.65304	1.65294	0.00010	0.000061
0.476393400	1.70134	1.70154	-0.00019	-0.000113
0.493271100	1.75135	1.77027	-0.01892	-0.010802
0.509911800	1.80290	1.78362	0.01928	0.010692
0.526293400	1.85523	1.85492	0.00030	0.000162
0.542394700	1.90785	1.90824	-0.00039	-0.000204
0.558200000	1.96068	1.98192	-0.02124	-0.010834
0.573690800	2.01383	1.99216	0.02167	0.010759
0.588853900	2.06665	2.06671	-0.00006	-0.000027
0.603677600	2.11807	2.13861	-0.02054	-0.009698
0.618153900	2.16711	2.14645	0.02066	0.009533
0.632272400	2.21350	2.21340	0.00009	0.000043
0.646028900	2.25763	2.25785	-0.00022	-0.000099
0.659417100	2.29988	2.31650	-0.01662	-0.007227
0.672435500	2.33857	2.32178	0.01678	0.007176
0.685081600	2.37150	2.37154	-0.00004	-0.000015
0.697355300	2.39948	2.39956	-0.00008	-0.000035
0.709256600	2.42323	2.42330	-0.00007	-0.000028
0.720789500	2.44315	2.44956	-0.00641	-0.002624
0.731953900	2.45938	2.45295	0.00642	0.002612
0.742756600	2.47209	2.47214	-0.00004	-0.000017
0.753200000	2.48147	2.48152	-0.00005	-0.000021
0.763289500	2.48816	2.48820	-0.00004	-0.000017
0.773030300	2.49407	2.49537	-0.00130	-0.000523
0.782430300	2.49917	2.49789	0.00128	0.000512
0.791496100	2.50329	2.50224	0.00105	0.000418
0.800232900	2.50629	2.50454	0.00176	0.000701
0.808648700	2.50821	2.50674	0.00147	0.000588
0.816752600	2.50989	2.50885	0.00104	0.000414
0.824552600	2.51150	2.51088	0.00062	0.000249
0.832053900	2.51305	2.51283	0.00023	0.000091
0.839267100	2.51455	2.51470	-0.00015	-0.000061
0.846200000	2.51598	2.51652	-0.00053	-0.000213
0.852860500	2.51736	2.51827	-0.00091	-0.000361
0.859257900	2.51869	2.51996	-0.00128	-0.000507
0.865398700	2.51996	2.52163	-0.00167	-0.000663

Sample: FULL- N2@77K- ADS/DES

Operator:

Submitter:

File: D:\OneDrive - Zachodniopomorski Uniwersytet Technologiczny w  
Szczecinie\Doktorat\B...\GdcSi\_FULL.SMP

Started:	18.11.2022 14:39:39	Analysis adsorptive:	N2
Completed:	21.11.2022 18:42:54	Analysis bath temp.:	77,300 K
Report time:	22.11.2022 14:25:29	Thermal correction:	Yes
Sample mass:	1,0243 g	Ambient free space:	28,0000 cm <sup>3</sup> Entered
Analysis free space:	83,0000 cm <sup>3</sup>	Equilibration interval:	30 s
Low pressure dose:	0,02824 mmol/g	Sample density:	1,000 g/cm <sup>3</sup>
Automatic degas:	No		

Isotherm Table

Relative Pressure (p/p°)	Experimental Quantity Adsorbed (mmol/g)	Fitted Quantity Adsorbed (mmol/g)	Absolute Residual (mmol/g)	Relative Residual
0.871292100	2.52118	2.52323	-0.00205	-0.000814

Sample: FULL- N2@77K- ADS/DES

Operator:

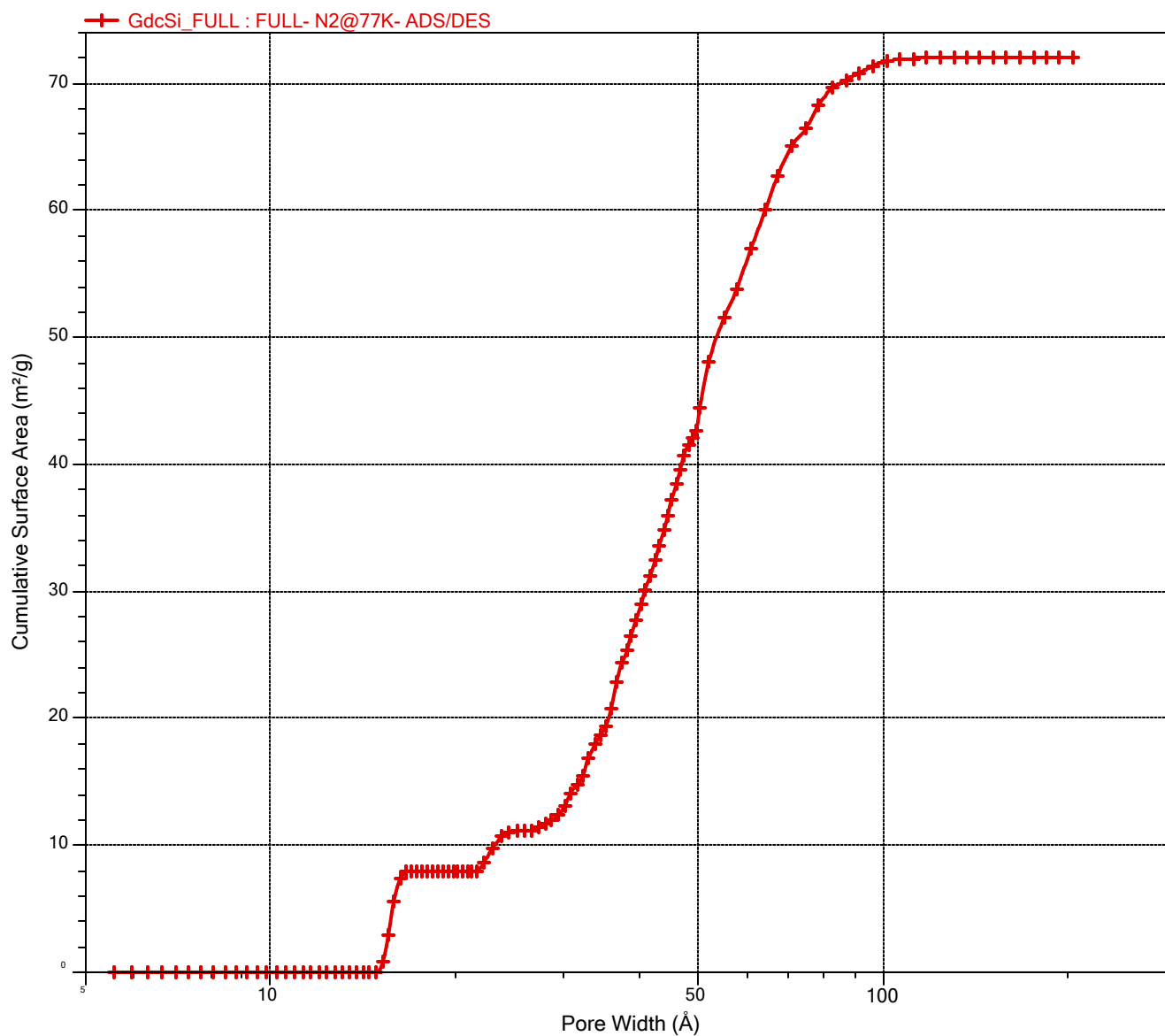
Submitter:

File: D:\OneDrive - Zachodniopomorski Uniwersytet Technologiczny w  
Szczecinie\Doktorat\B...\GdcSi\_FULL.SMP

Started: 18.11.2022 14:39:39  
Completed: 21.11.2022 18:42:54  
Report time: 22.11.2022 14:25:29  
Sample mass: 1,0243 g  
Analysis free space: 83,0000 cm<sup>3</sup>  
Low pressure dose: 0,02824 mmol/g  
Automatic degas: No

Analysis adsorptive: N2  
Analysis bath temp.: 77,300 K  
Thermal correction: Yes  
Ambient free space: 28,0000 cm<sup>3</sup> Entered  
Equilibration interval: 30 s  
Sample density: 1,000 g/cm<sup>3</sup>

Cumulative Surface Area vs. Pore Width



Sample: FULL- N2@77K- ADS/DES

Operator:

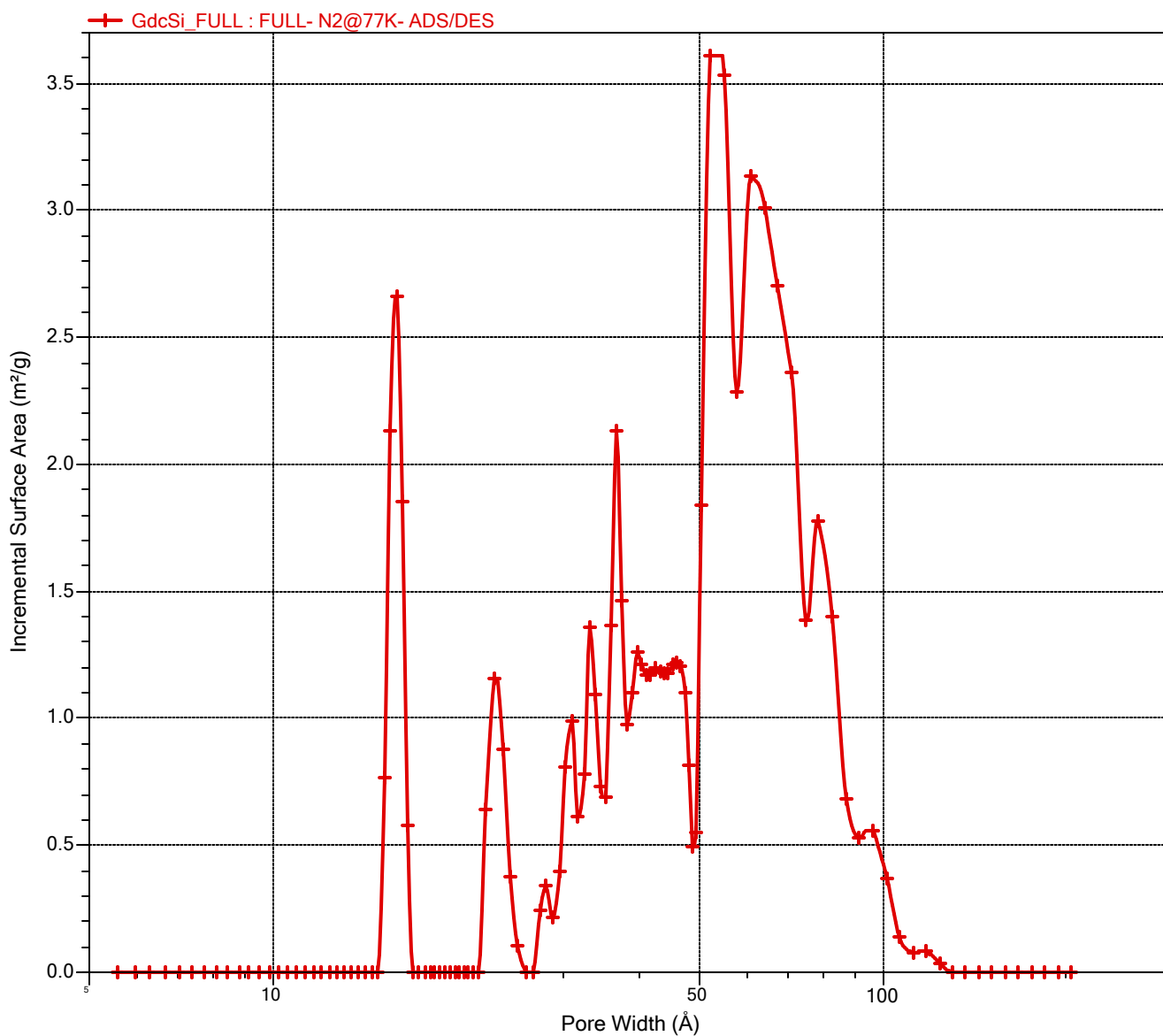
Submitter:

File: D:\OneDrive - Zachodniopomorski Uniwersytet Technologiczny w  
Szczecinie\Doktorat\B...\GdcSi\_FULL.SMP

Started: 18.11.2022 14:39:39  
Completed: 21.11.2022 18:42:54  
Report time: 22.11.2022 14:25:29  
Sample mass: 1,0243 g  
Analysis free space: 83,0000 cm<sup>3</sup>  
Low pressure dose: 0,02824 mmol/g  
Automatic degas: No

Analysis adsorptive: N2  
Analysis bath temp.: 77,300 K  
Thermal correction: Yes  
Ambient free space: 28,0000 cm<sup>3</sup> Entered  
Equilibration interval: 30 s  
Sample density: 1,000 g/cm<sup>3</sup>

### Incremental Surface Area vs. Pore Width



Sample: FULL- N2@77K- ADS/DES

Operator:

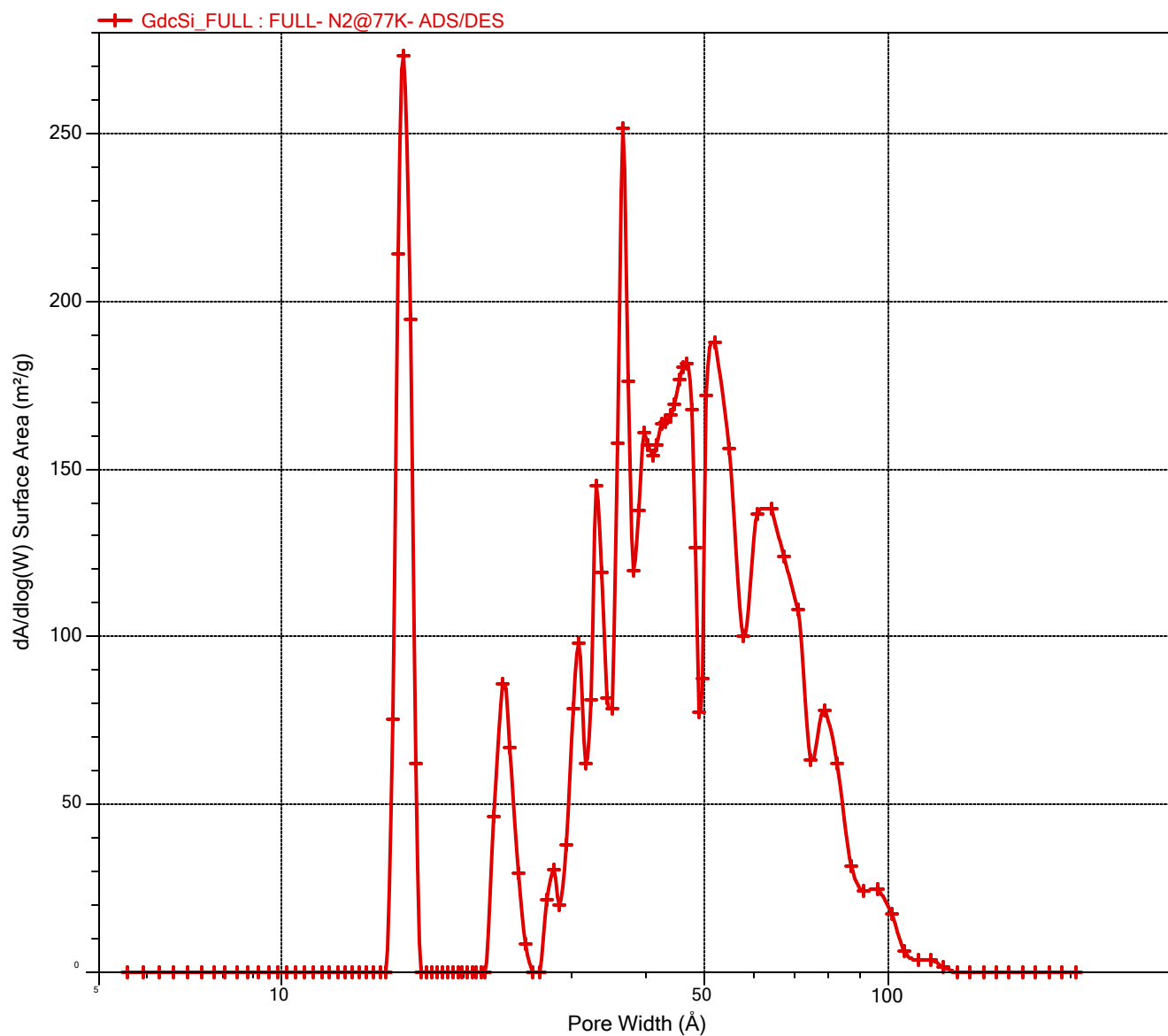
Submitter:

File: D:\OneDrive - Zachodniopomorski Uniwersytet Technologiczny w  
Szczecinie\Doktorat\B...\GdcSi\_FULL.SMP

Started: 18.11.2022 14:39:39  
Completed: 21.11.2022 18:42:54  
Report time: 22.11.2022 14:25:29  
Sample mass: 1,0243 g  
Analysis free space: 83,0000 cm<sup>3</sup>  
Low pressure dose: 0,02824 mmol/g  
Automatic degas: No

Analysis adsorptive: N2  
Analysis bath temp.: 77,300 K  
Thermal correction: Yes  
Ambient free space: 28,0000 cm<sup>3</sup> Entered  
Equilibration interval: 30 s  
Sample density: 1,000 g/cm<sup>3</sup>

dA/dlog(W) Surface Area vs. Pore Width





Sample: FULL- N2@77K- ADS/DES

Operator:

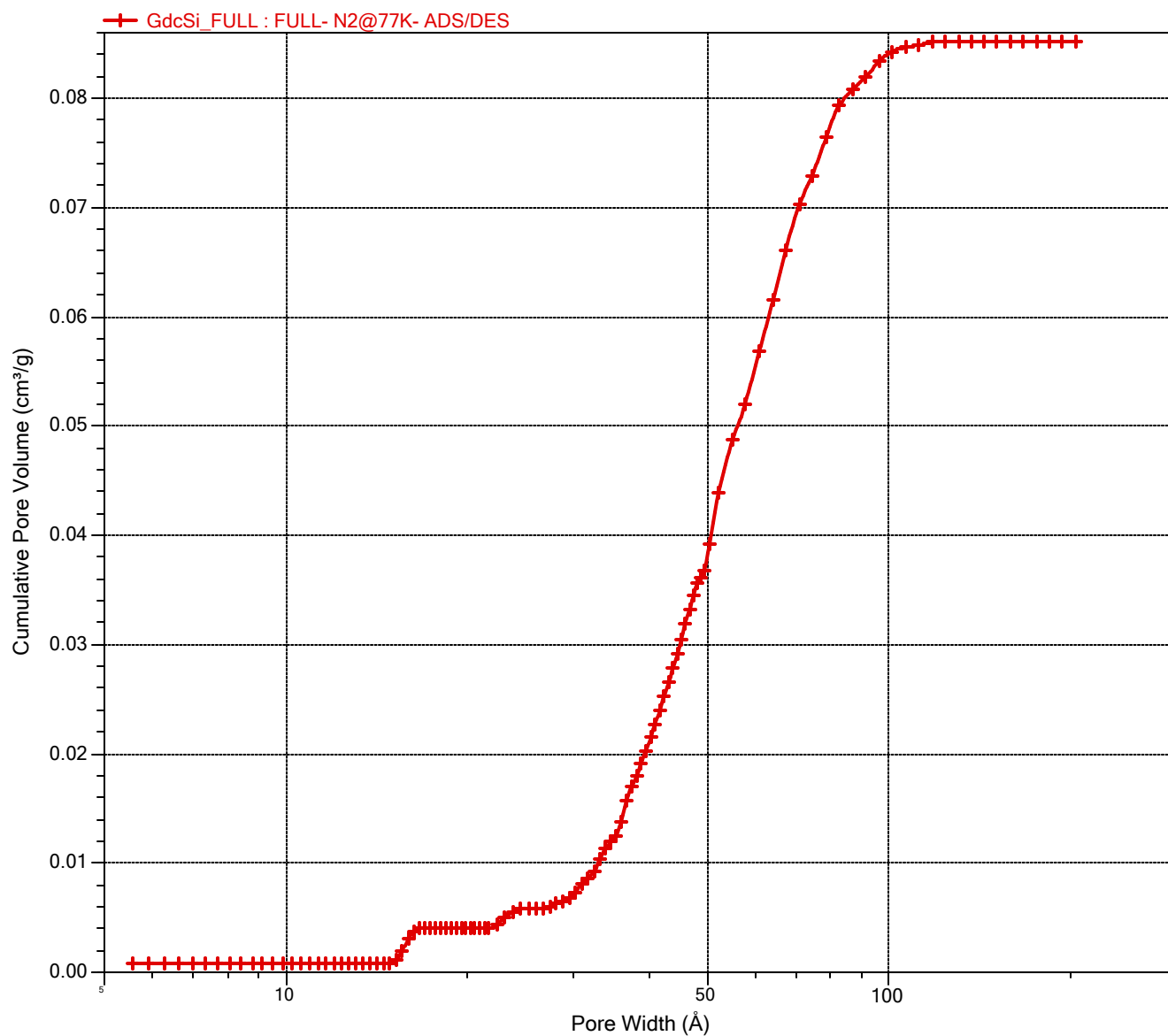
Submitter:

File: D:\OneDrive - Zachodniopomorski Uniwersytet Technologiczny w  
Szczecinie\Doktorat\B...\GdcSi\_FULL.SMP

Started: 18.11.2022 14:39:39  
Completed: 21.11.2022 18:42:54  
Report time: 22.11.2022 14:25:29  
Sample mass: 1,0243 g  
Analysis free space: 83,0000 cm<sup>3</sup>  
Low pressure dose: 0,02824 mmol/g  
Automatic degas: No

Analysis adsorptive: N2  
Analysis bath temp.: 77,300 K  
Thermal correction: Yes  
Ambient free space: 28,0000 cm<sup>3</sup> Entered  
Equilibration interval: 30 s  
Sample density: 1,000 g/cm<sup>3</sup>

Cumulative Pore Volume vs. Pore Width



Sample: FULL- N2@77K- ADS/DES

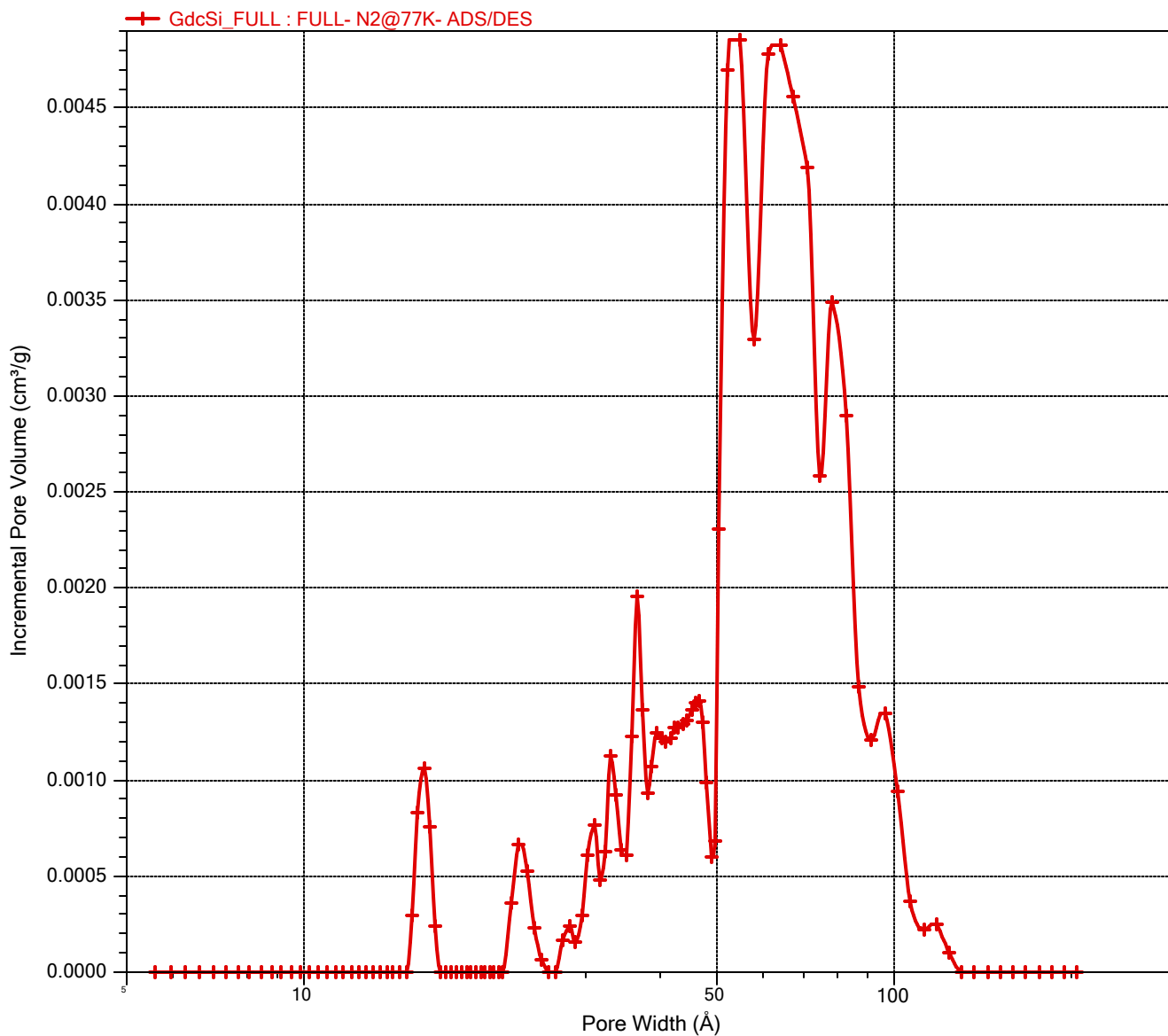
Operator:

Submitter:

File: D:\OneDrive - Zachodniopomorski Uniwersytet Technologiczny w  
Szczecinie\Doktorat\B...\GdcSi\_FULL.SMP

Started:	18.11.2022 14:39:39	Analysis adsorptive:	N2
Completed:	21.11.2022 18:42:54	Analysis bath temp.:	77,300 K
Report time:	22.11.2022 14:25:29	Thermal correction:	Yes
Sample mass:	1,0243 g	Ambient free space:	28,0000 cm <sup>3</sup> Entered
Analysis free space:	83,0000 cm <sup>3</sup>	Equilibration interval:	30 s
Low pressure dose:	0,02824 mmol/g	Sample density:	1,000 g/cm <sup>3</sup>
Automatic degas:	No		

Incremental Pore Volume vs. Pore Width



Sample: FULL- N2@77K- ADS/DES

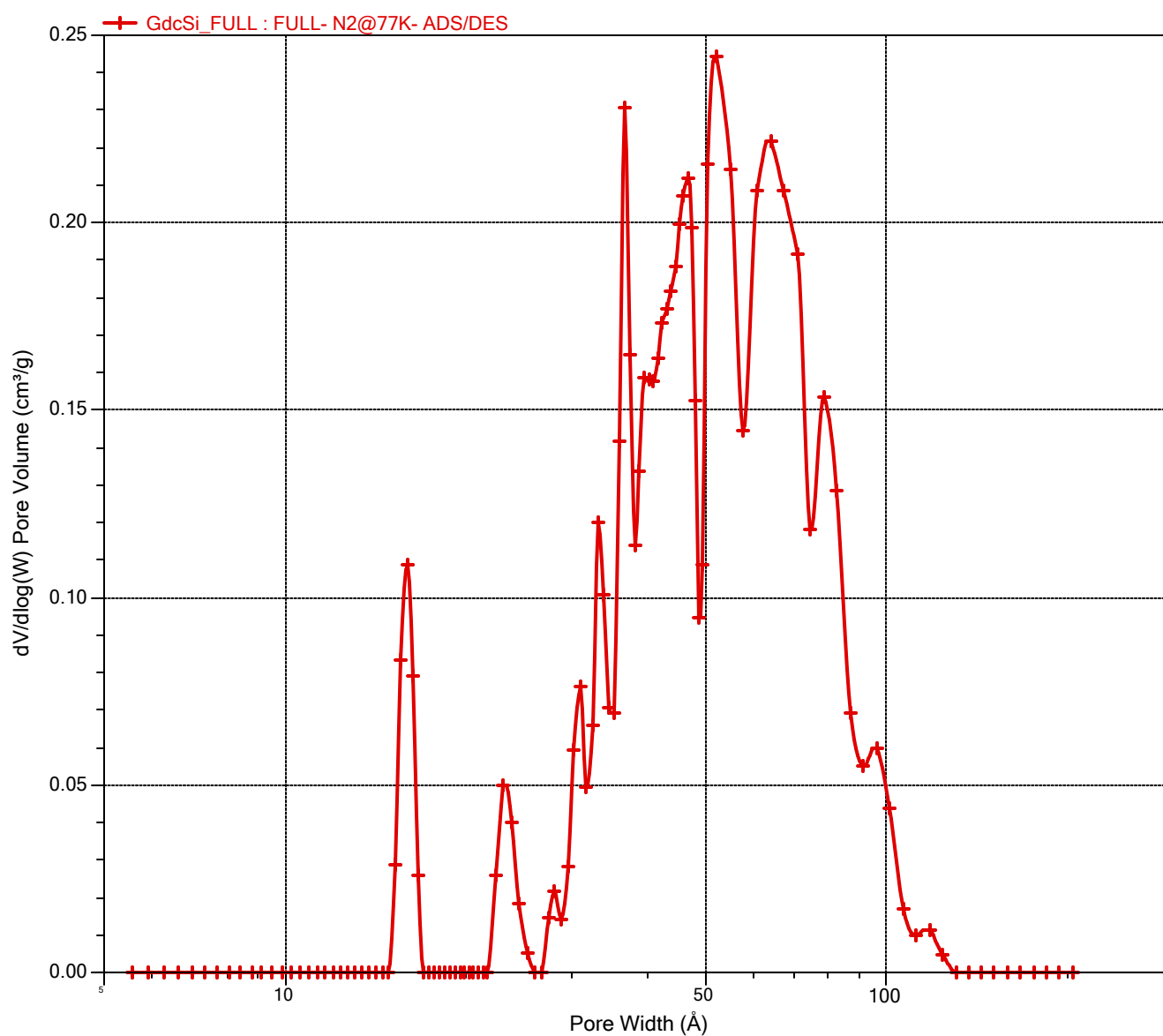
Operator:

Submitter:

File: D:\OneDrive - Zachodniopomorski Uniwersytet Technologiczny w  
Szczecinie\Doktorat\B...\GdcSi\_FULL.SMP

Started:	18.11.2022 14:39:39	Analysis adsorptive:	N2
Completed:	21.11.2022 18:42:54	Analysis bath temp.:	77,300 K
Report time:	22.11.2022 14:25:29	Thermal correction:	Yes
Sample mass:	1,0243 g	Ambient free space:	28,0000 cm <sup>3</sup> Entered
Analysis free space:	83,0000 cm <sup>3</sup>	Equilibration interval:	30 s
Low pressure dose:	0,02824 mmol/g	Sample density:	1,000 g/cm <sup>3</sup>
Automatic degas:	No		

dV/dlog(W) Pore Volume vs. Pore Width



Sample: FULL- N2@77K- ADS/DES

Operator:

Submitter:

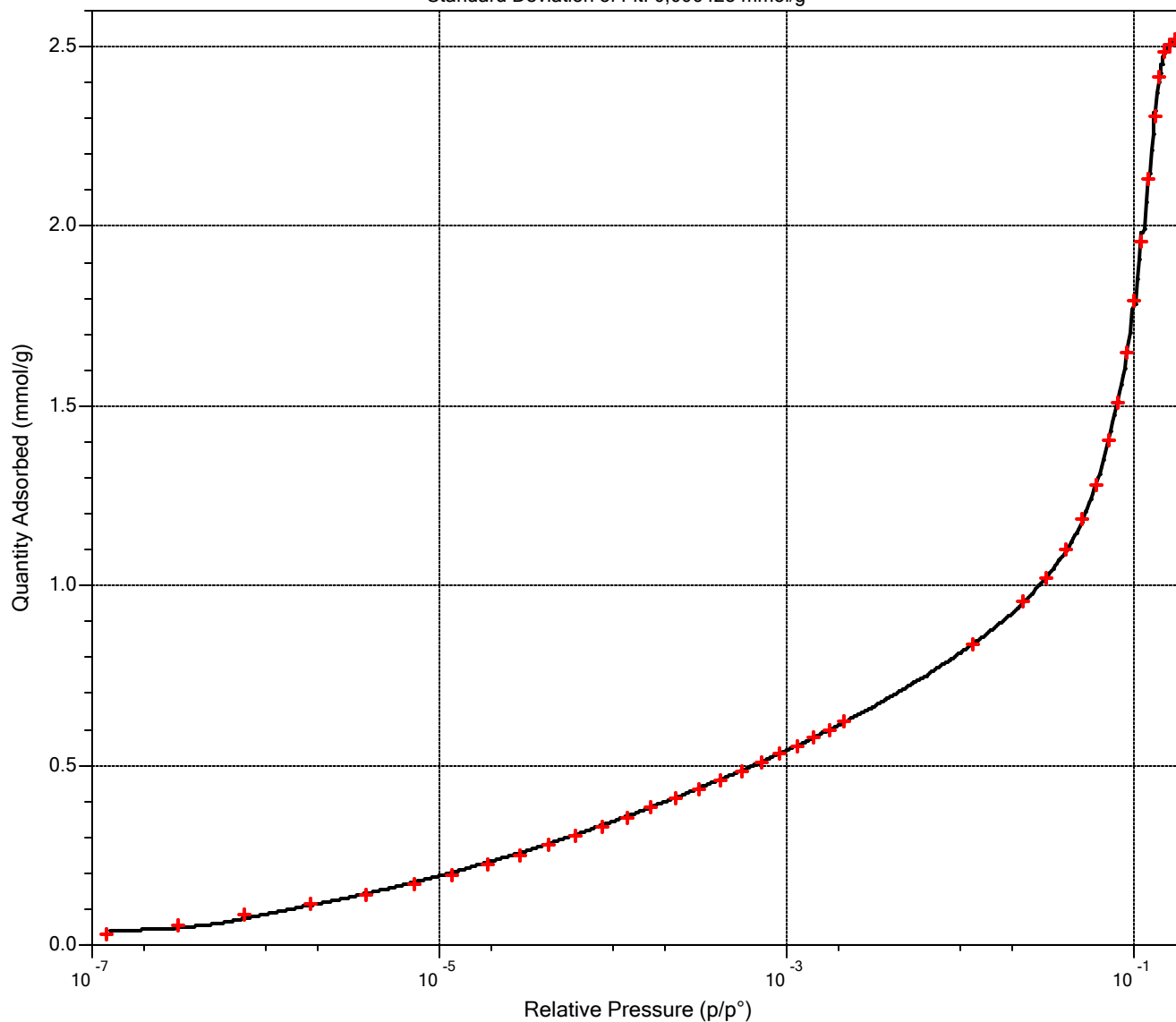
File: D:\OneDrive - Zachodniopomorski Uniwersytet Technologiczny w  
Szczecinie\Doktorat\B...\GdcSi\_FULL.SMP

Started: 18.11.2022 14:39:39  
Completed: 21.11.2022 18:42:54  
Report time: 22.11.2022 14:25:29  
Sample mass: 1,0243 g  
Analysis free space: 83,0000 cm<sup>3</sup>  
Low pressure dose: 0,02824 mmol/g  
Automatic degas: No

Analysis adsorptive: N2  
Analysis bath temp.: 77,300 K  
Thermal correction: Yes  
Ambient free space: 28,0000 cm<sup>3</sup> Entered  
Equilibration interval: 30 s  
Sample density: 1,000 g/cm<sup>3</sup>

### Goodness of Fit

Standard Deviation of Fit: 0,006425 mmol/g



Sample: FULL- N2@77K- ADS/DES

Operator:

Submitter:

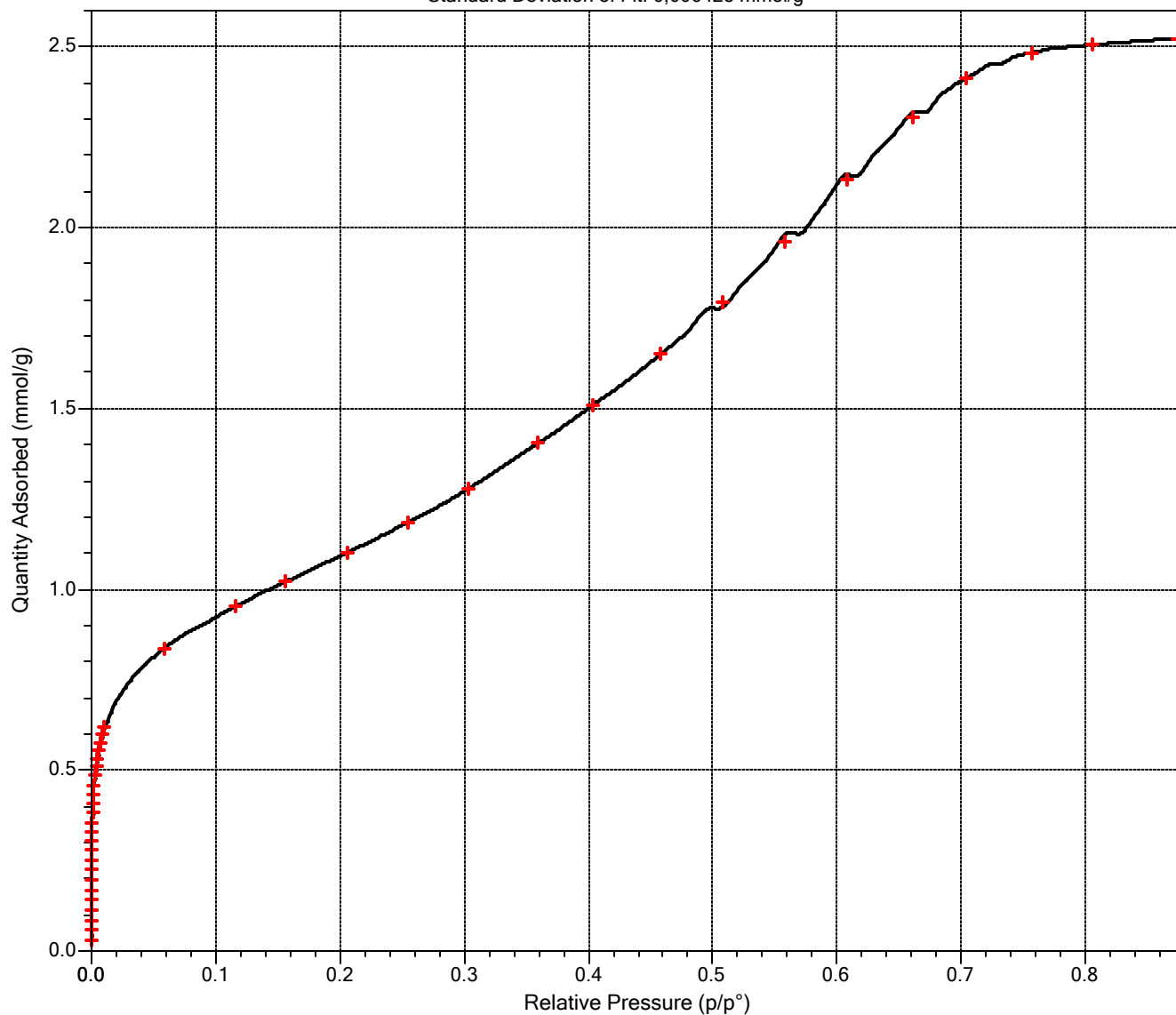
File: D:\OneDrive - Zachodniopomorski Uniwersytet Technologiczny w  
Szczecinie\Doktorat\B...\GdcSi\_FULL.SMP

Started: 18.11.2022 14:39:39  
Completed: 21.11.2022 18:42:54  
Report time: 22.11.2022 14:25:29  
Sample mass: 1,0243 g  
Analysis free space: 83,0000 cm<sup>3</sup>  
Low pressure dose: 0,02824 mmol/g  
Automatic degas: No

Analysis adsorptive: N2  
Analysis bath temp.: 77,300 K  
Thermal correction: Yes  
Ambient free space: 28,0000 cm<sup>3</sup> Entered  
Equilibration interval: 30 s  
Sample density: 1,000 g/cm<sup>3</sup>

### Goodness of Fit

Standard Deviation of Fit: 0,006425 mmol/g



Sample: FULL- N2@77K- ADS/DES

Operator:

Submitter:

File: D:\OneDrive - Zachodniopomorski Uniwersytet Technologiczny w  
Szczecinie\Doktorat\B...\GdcSi\_FULL.SMP

Started:	18.11.2022 14:39:39	Analysis adsorptive:	N2
Completed:	21.11.2022 18:42:54	Analysis bath temp.:	77,300 K
Report time:	22.11.2022 14:25:29	Thermal correction:	Yes
Sample mass:	1,0243 g	Ambient free space:	28,0000 cm <sup>3</sup> Entered
Analysis free space:	83,0000 cm <sup>3</sup>	Equilibration interval:	30 s
Low pressure dose:	0,02824 mmol/g	Sample density:	1,000 g/cm <sup>3</sup>
Automatic degas:	No		

## Sample Information

Method: FULL- N2@77K- ADS/DES  
 Sample: FULL- N2@77K- ADS/DES  
 Operator:  
 Submitter:  
 Mass type: Entered  
 Sample mass: 1,0243 g  
 Density: 1,000 g/cm<sup>3</sup>  
 Type of data: Automatically collected  
 Instrument type: 2460  
 Original instrument type: 2460  
 Comments:

## Sample Tube

Sample tube: W1  
 Ambient free space: 1,0000 cm<sup>3</sup>  
 Analysis free space: 1,0000 cm<sup>3</sup>  
 Non-ideality factor: 0,0000620  
 Use isothermal jacket: Yes  
 Use filler rod: No  
 Vacuum seal type: None

## Degas Conditions

Degas conditions: FULL- N2@77K- ADS/DES

Smart VacPrep evacuation  
 Backfill sample tube: Automatic  
 Evacuation rate: 0,27 kPa/s  
 Unrest. evacuation from: 0,27 kPa  
 Vacuum level: 7e-02 kPa  
 Evacuation time: 60 min  
 Temperature ramp rate: 10,0 K/min  
 Target temperature: 363 K  
 Hold pressure: 13,3 kPa

### Heating Phase

Sample prep: Stage	Temperature (K)	Ramp Rate (K/min)	Time (min)
1	523	10,0	720

## Analysis Conditions

Sample: FULL- N2@77K- ADS/DES

Operator:

Submitter:

File: D:\OneDrive - Zachodniopomorski Uniwersytet Technologiczny w  
Szczecinie\Doktorat\B...\GdcSi\_FULL.SMP

Started:	18.11.2022 14:39:39	Analysis adsorptive:	N2
Completed:	21.11.2022 18:42:54	Analysis bath temp.:	77,300 K
Report time:	22.11.2022 14:25:29	Thermal correction:	Yes
Sample mass:	1,0243 g	Ambient free space:	28,0000 cm <sup>3</sup> Entered
Analysis free space:	83,0000 cm <sup>3</sup>	Equilibration interval:	30 s
Low pressure dose:	0,02824 mmol/g	Sample density:	1,000 g/cm <sup>3</sup>
Automatic degas:	No		

Analysis conditions: FULL- N2@77K- ADS/DES  
 Isotherm collection: Target Pressure  
 Absolute pressure dosing: No

Pressure Table		
Starting Pressure (p/p°)	Pressure Increment (p/p°)	Ending Pressure (p/p°)
0,000000000		0,010000000
0,010000000	0,050000000	0,995000000
0,995000000	0,100000000	0,150000000

## Preparation

Fast evacuation: No  
 Evacuation rate: 0,27 kPa/s  
 Unrestricted evacuation from: 0,27 kPa  
 Vacuum setpoint: 1,3 Pa  
 Evacuation time: 4,00 h

Leak test: No  
 Use TranSeal: No

## Free Space

Entered

Ambient free space: 28,0000 cm<sup>3</sup>  
 Analysis free space: 83,0000 cm<sup>3</sup>

## p° and Temperature

p° type: Measured in Psat tube for each point  
 Temperature type: Entered  
 Temperature: 77,300 K

## Dosing

Use first pressure fixed dose: No  
 Use maximum volume increment: No  
 Target tolerance: 5.0% or 0,6666 kPa  
 Low pressure dosing: Yes  
 Dose amount: 0,02824 mmol/g  
 Minimum equilibration delay: 0,50 h  
 Maximum equilibration delay: 2,00 h  
 Maximum number of decants: 6

Sample: FULL- N2@77K- ADS/DES

Operator:

Submitter:

File: D:\OneDrive - Zachodniopomorski Uniwersytet Technologiczny w  
Szczecinie\Doktorat\B...\GdcSi\_FULL.SMP

Started:	18.11.2022 14:39:39	Analysis adsorptive:	N2
Completed:	21.11.2022 18:42:54	Analysis bath temp.:	77,300 K
Report time:	22.11.2022 14:25:29	Thermal correction:	Yes
Sample mass:	1,0243 g	Ambient free space:	28,0000 cm <sup>3</sup> Entered
Analysis free space:	83,0000 cm <sup>3</sup>	Equilibration interval:	30 s
Low pressure dose:	0,02824 mmol/g	Sample density:	1,000 g/cm <sup>3</sup>
Automatic degas:	No		

	Equilibration Relative Pressure (p/p°)	Equilibration Interval (s)
1	1,000000000	30

Minimum equilibration delay at p/p° &gt;= 0.995: 600 s

## Sample Backfill

Backfill at start of analysis: Yes

Backfill at end of analysis: Yes

Backfill gas: N2

## Adsorptive Properties

Adsorptive:	Nitrogen @ 77.35 K (N2)
Non-condensing adsorptive:	No
Maximum manifold pressure:	123,323 kPa
Therm. tran. hard-sphere diameter:	3,8600 Å
Molecular cross-sectional area:	0,162 nm <sup>2</sup>
Adsorbate molecular weight:	28,01
Thermal conductivity:	1,00
Non-ideality factor:	0,0000620
Density conversion factor:	0,0015468
Dosing method:	Normal

## Psat vs. Temperature Table

	Saturation Pressure (kPa)	Temperature (K)
1	80,0192	75,40
2	84,5947	75,85
3	89,9104	76,35
4	96,0481	76,90
5	98,9411	77,15
6	101,3028	77,35
7	103,7071	77,55
8	107,3945	77,85
9	113,7597	78,35
10	120,4064	78,85

## Report Options

Inside diameter of sample tube: 9,53 mm



Sample: FULL- N2@77K- ADS/DES

Operator:

Submitter:

File: D:\OneDrive - Zachodniopomorski Uniwersytet Technologiczny w  
Szczecinie\Doktorat\B...\GdcSi\_FULL.SMP

Started:	18.11.2022 14:39:39	Analysis adsorptive:	N2
Completed:	21.11.2022 18:42:54	Analysis bath temp.:	77,300 K
Report time:	22.11.2022 14:25:29	Thermal correction:	Yes
Sample mass:	1,0243 g	Ambient free space:	28,0000 cm <sup>3</sup> Entered
Analysis free space:	83,0000 cm <sup>3</sup>	Equilibration interval:	30 s
Low pressure dose:	0,02824 mmol/g	Sample density:	1,000 g/cm <sup>3</sup>
Automatic degas:	No		

## Sample Log

Date	Time	Log Message
18.11.2022	14:39:39	Starting a sample analysis for C:\ASAP 2460\data\2022\Kędzierski\Si...\GdcSi_FULL.SMP on port 5.
18.11.2022	19:45:20	Low pressure data collection started
21.11.2022	11:17:39	Standard data collection started.
21.11.2022	18:19:28	Termination started.
21.11.2022	18:42:54	Finished a sample analysis for C:\ASAP 2460\data\2022\Kędzierski\Si...\GdcSi_FULL.SMP on port 5.