

MICROMERITICS INSTRUMENT CORPORATION TRISTAR 3000

DEMO TriStar 3000 V6.04 A

Unit 1 Port 2

Serial #: 439

Page 1

Sample: Silica Alumina reference material
 Operator: Ana Medina
 Submitter: MIC,QA
 File: C:\DEMO3000\DATA\SIALREF.SMP

Started: 10/23/2002 8:31:01 AM	Analysis Adsorptive: N2
Completed: 10/24/2002 8:46:53 AM	Analysis Bath Temp.: 77.350 K
Report Time: 3/31/2006 2:43:25 PM	Sample Mass: 0.2940 g
Warm Free Space: 6.6083 cm ³ Measured	Cold Free Space: 20.2326 cm ³ Measured
Equilibration Interval: 10 s	Low Pressure Dose: None
Sample Density: 1.000 g/cm ³	Automatic Degas: Yes

Sample Prep: Stage	Soak Temperature (°C)	Ramp Rate (°C/min)	Soak Time (min)
1	90	10	60
2	350	10	960

Isotherm Tabular Report

Relative Pressure (P/Po)	Absolute Pressure (mmHg)	Quantity Adsorbed (cm ³ /g STP)	Elapsed Time (h:min)	Saturation Pressure (mmHg)
			00:42	750.76270
0.050677858	38.06053	45.4169	01:00	
0.073657115	55.32514	48.3915	01:06	
0.088973841	66.83769	50.0998	01:12	
0.108345691	81.40115	52.0883	01:19	
0.132992000	99.92995	54.4350	01:25	
0.148691213	111.74170	55.8642	01:32	
0.173455408	130.36742	58.0508	01:38	
0.198802409	149.43561	60.2477	01:44	
0.224363241	168.67236	62.4418	01:51	
0.250062750	188.01868	64.6517	01:58	
0.272577603	204.97145	66.6077	02:04	
0.297905308	224.04807	68.8409	02:11	
0.318912927	239.87572	70.7361	02:17	
0.339164961	255.13870	72.6129	02:23	
0.378204072	284.55640	76.3910	02:32	
0.418313116	314.79581	80.5460	02:42	
			02:43	752.55109
0.458884609	345.31754	85.1748	02:52	
0.499294364	375.70444	90.3301	03:03	
0.538664424	405.30331	96.1087	03:15	
0.578389898	435.16348	102.9776	03:28	
0.621731207	467.72479	112.2661	03:47	
0.658589157	495.41052	122.3902	04:03	
0.701311795	527.48303	138.5204	04:26	
			04:43	752.06946
0.741681916	557.75616	161.8976	04:54	
0.784686812	589.93817	206.0170	05:35	
0.819562884	615.99310	272.1202	06:16	
			06:43	751.47888
0.864143920	649.31714	353.6646	07:03	
0.906938091	681.38965	376.8159	07:26	
0.908913205	682.85187	377.4179	07:32	
0.918656896	690.12097	380.3734	07:46	
0.930291193	698.80176	384.4637	08:02	
0.940156390	706.16351	387.9185	08:15	
0.950489331	713.87933	391.1830	08:27	
0.953684016	716.25598	392.1689	08:33	
0.958982537	720.20868	393.6970	08:40	
			08:43	751.00140

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0.964190165	724.09393	394.9979	08:46	
0.968374226	727.21228	395.9584	08:51	
0.973266373	730.85736	397.0422	08:57	
0.978877197	735.04181	398.1379	09:03	
0.981669619	737.11932	398.6087	09:07	
0.984035595	738.87653	399.0421	09:11	
0.986972492	741.07202	399.6773	09:13	
0.988950644	742.54272	402.0026	09:16	
0.990632233	743.78583	407.6637	09:20	
0.992302691	745.02051	416.4384	09:24	
0.993373608	745.80011	422.8241	09:29	
0.993682102	746.00238	506.8588	09:35	
0.993290984	745.69897	506.1596	09:37	
0.993034573	745.49670	505.2979	09:39	
0.992302779	744.92780	500.5972	09:43	
0.989830621	742.95990	410.9047	10:06	
0.987237226	740.97931	403.2737	10:13	
0.984163864	738.65320	402.6258	10:17	
0.977350188	733.52484	402.4267	10:20	
0.971692088	729.26874	402.2812	10:22	
0.971160112	728.85992	402.2258	10:24	
0.965670291	724.73029	402.1033	10:26	
0.957452043	718.54840	401.9106	10:29	
0.956156256	717.56653	401.8477	10:31	
0.950178054	713.06604	401.7247	10:34	
0.938702656	704.43579	401.4494	10:38	
0.931415407	698.95343	401.2739	10:41	
			10:43	750.41089
0.922059298	691.92456	401.0415	10:44	
0.911446688	683.96436	400.7731	10:47	
0.901343704	676.38770	400.5149	10:51	
0.891500675	669.00482	400.2452	10:54	
0.860238579	645.55408	399.3572	11:02	
0.821897994	616.78955	398.1221	11:09	
0.781692685	586.68921	351.7124	12:18	
			12:43	750.57007
0.738620021	553.99304	207.4261	14:00	
			14:43	749.74078
0.699582677	524.49951	153.3231	14:46	
0.661730450	496.02155	128.9099	15:37	

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0.621370993	465.71051	113.1552	16:09	
0.581398139	435.71552	103.1869	16:30	
			16:43	749.38898
0.542026128	406.17563	95.7706	16:46	
0.499383489	374.15793	89.2544	17:02	
0.460566142	345.03101	84.1603	17:14	
0.421972054	316.08527	79.6719	17:24	
0.380050448	284.65332	75.2425	17:34	
0.341158481	255.49689	71.4498	17:44	
0.298780641	223.73624	67.5520	17:54	
0.250900985	187.86275	63.3244	18:04	
0.199060039	149.03107	58.8455	18:14	
0.148698376	111.31609	54.4235	18:23	
0.134639733	100.78539	53.1392	18:29	
0.109258906	81.78041	50.7155	18:36	
			18:44	748.43823
0.088858089	66.50479	48.6122	18:44	
0.073678679	55.14394	46.8981	18:53	

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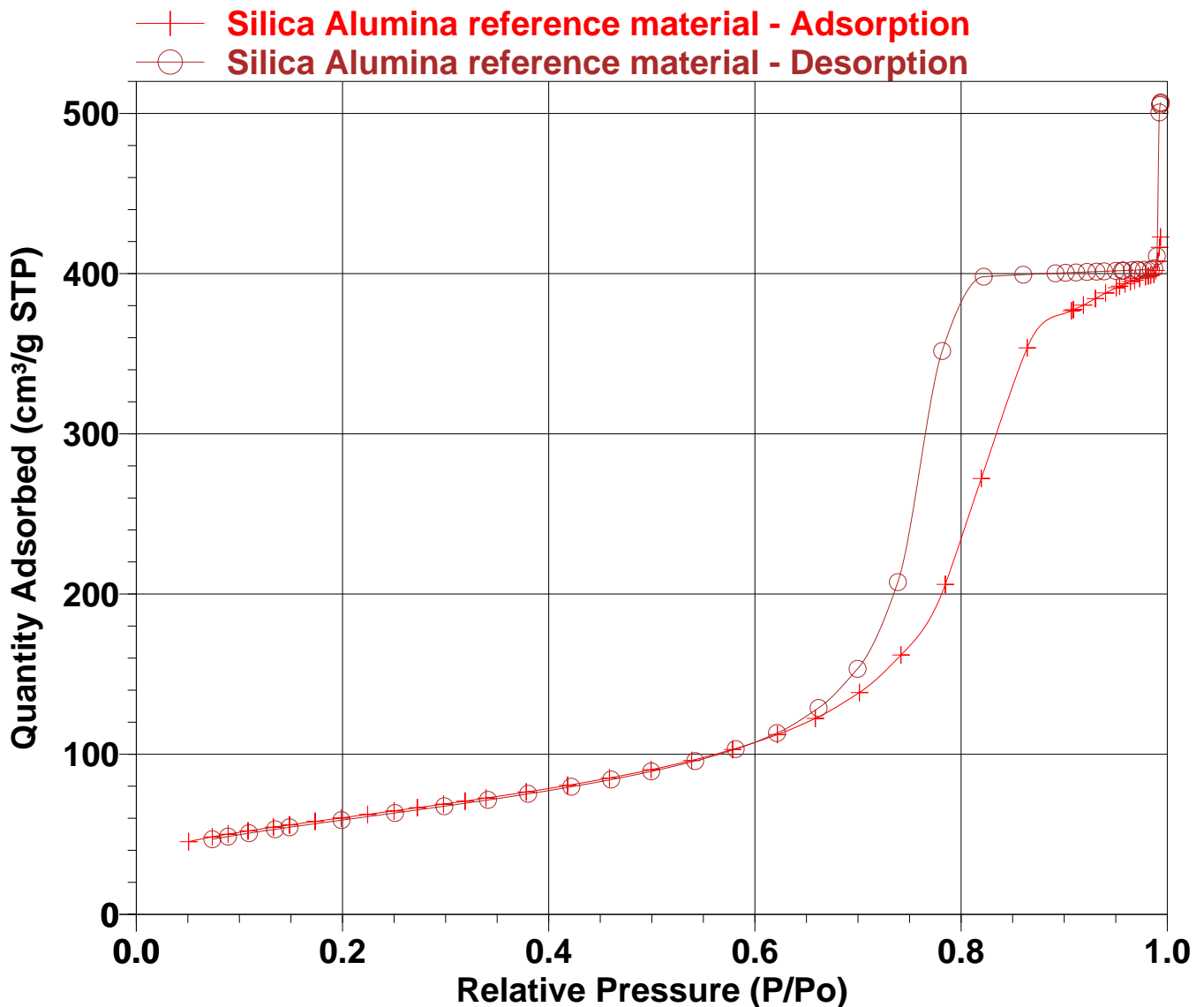
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Isotherm Linear Plot



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BET Surface Area Report

BET Surface Area: 215.4737 ± 0.7037 m²/g
 Slope: 0.020049 ± 0.000065 g/cm³ STP
 Y-Intercept: 0.000154 ± 0.000012 g/cm³ STP
 C: 131.085726
 Qm: 49.4978 cm³/g STP
 Correlation Coefficient: 0.9999477
 Molecular Cross-Sectional Area: 0.1620 nm²

Relative Pressure (P/Po)	Quantity Adsorbed (cm ³ /g STP)	1/[Q(Po/P - 1)]
0.050677858	45.4169	0.001175
0.073657115	48.3915	0.001643
0.088973841	50.0998	0.001949
0.108345691	52.0883	0.002333
0.132992000	54.4350	0.002818
0.148691213	55.8642	0.003127
0.173455408	58.0508	0.003615
0.198802409	60.2477	0.004119
0.224363241	62.4418	0.004633
0.250062750	64.6517	0.005158
0.272577603	66.6077	0.005626
0.297905308	68.8409	0.006164

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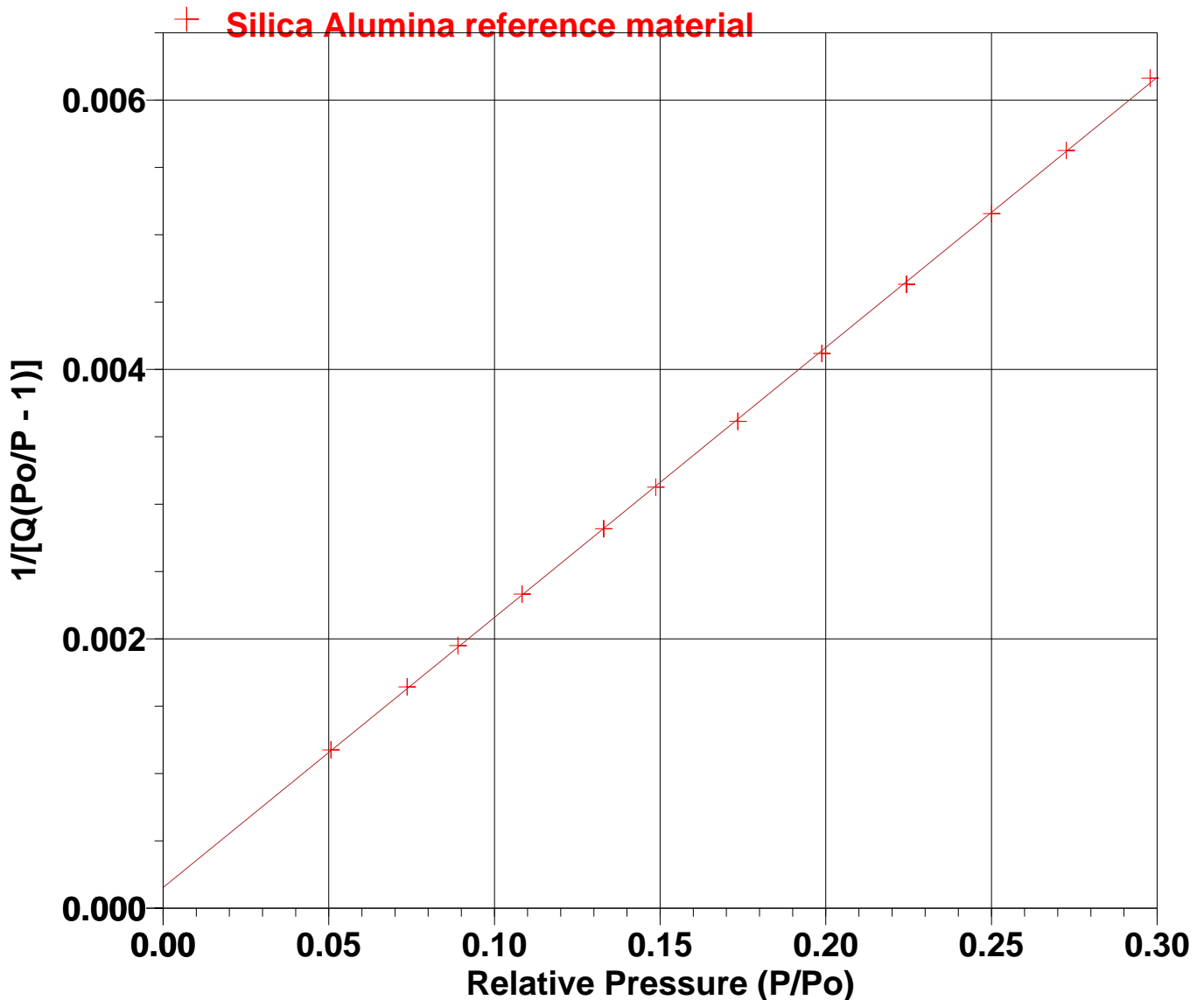
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BET Surface Area Plot



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 Report Time: 3/31/2006 2:43:25PM Sample Mass: 0.2940 g
 Warm Free Space: 6.6083 cm³ Measured Cold Free Space: 20.2326 cm³ Measured
 Equilibration Interval: 10 s Low Pressure Dose: None
 Sample Density: 1.000 g/cm³ Automatic Degas: Yes

Sample Prep: Stage	Soak Temperature (°C)	Ramp Rate (°C/min)	Soak Time (min)
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BJH Adsorption Pore Distribution Report

$$t = 3.54 [-5 / \ln(P/P_0)] ^{0.333}$$

Diameter Range: 17.000 Å to 3000.000 Å

Adsorbate Property Factor: 9.53000 Å

Density Conversion Factor: 0.0015468

Fraction of Pores Open at Both Ends: 0.00

Pore Diameter Range (Å)	Average Diameter (Å)	Incremental Pore Volume (cm ³ /g)	Cumulative Pore Volume (cm ³ /g)	Incremental Pore Area (m ² /g)	Cumulative Pore Area (m ² /g)
2928.3 - 2525.0	2696.6	0.010319	0.010319	0.153	0.153
2525.0 - 2079.5	2258.9	0.014221	0.024540	0.252	0.405
2079.5 - 1766.8	1897.5	0.009186	0.033726	0.194	0.599
1766.8 - 1502.0	1612.7	0.003733	0.037459	0.093	0.691
1502.0 - 1229.4	1338.2	0.000930	0.038389	0.028	0.719
1229.4 - 1073.2	1140.5	0.000641	0.039030	0.022	0.741
1073.2 - 933.6	993.5	0.000708	0.039738	0.029	0.770
933.6 - 740.8	814.7	0.001724	0.041462	0.085	0.855
740.8 - 628.3	675.1	0.001763	0.043225	0.104	0.959
628.3 - 556.3	587.8	0.001589	0.044814	0.108	1.067
556.3 - 487.1	517.0	0.002190	0.047004	0.169	1.237
487.1 - 432.5	456.5	0.002619	0.049622	0.229	1.466
432.5 - 405.2	417.9	0.001707	0.051329	0.163	1.629
405.2 - 336.7	364.4	0.005730	0.057059	0.629	2.258
336.7 - 290.0	309.7	0.006178	0.063237	0.798	3.056
290.0 - 249.4	266.5	0.007422	0.070659	1.114	4.170
249.4 - 223.2	234.8	0.005397	0.076055	0.919	5.090
223.2 - 218.6	220.9	0.001107	0.077162	0.200	5.290
218.6 - 150.7	171.8	0.044932	0.122094	10.461	15.752
150.7 - 113.7	126.7	0.168962	0.291056	53.333	69.085
113.7 - 95.2	102.7	0.139847	0.430903	54.475	123.560
95.2 - 79.1	85.5	0.090885	0.521788	42.511	166.072
79.1 - 68.0	72.6	0.044887	0.566675	24.721	190.792
68.0 - 59.0	62.8	0.028280	0.594955	18.008	208.800
59.0 - 52.8	55.5	0.015989	0.610943	11.515	220.315
52.8 - 46.8	49.4	0.013169	0.624112	10.661	230.977
46.8 - 42.2	44.2	0.008545	0.632657	7.725	238.701
42.2 - 38.3	40.1	0.006324	0.638981	6.316	245.017
38.3 - 34.8	36.4	0.004877	0.643858	5.362	250.379
34.8 - 31.8	33.1	0.003787	0.647646	4.573	254.952
31.8 - 29.0	30.3	0.002844	0.650490	3.761	258.713
29.0 - 26.6	27.7	0.002201	0.652691	3.178	261.891
26.6 - 25.5	26.0	0.000938	0.653629	1.441	263.332
25.5 - 24.3	24.9	0.000828	0.654457	1.332	264.664

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Pore Diameter Range (Å)	Average Diameter (Å)	Incremental Pore Volume (cm ³ /g)	Cumulative Pore Volume (cm ³ /g)	Incremental Pore Area (m ² /g)	Cumulative Pore Area (m ² /g)
24.3 - 23.0	23.6	0.000830	0.655287	1.407	266.072
23.0 - 21.8	22.4	0.000613	0.655900	1.096	267.168
21.8 - 20.6	21.1	0.000542	0.656442	1.026	268.194
20.6 - 19.3	19.9	0.000379	0.656821	0.763	268.957
19.3 - 18.1	18.7	0.000224	0.657046	0.480	269.437
18.1 - 17.0	17.5	0.000030	0.657076	0.070	269.507

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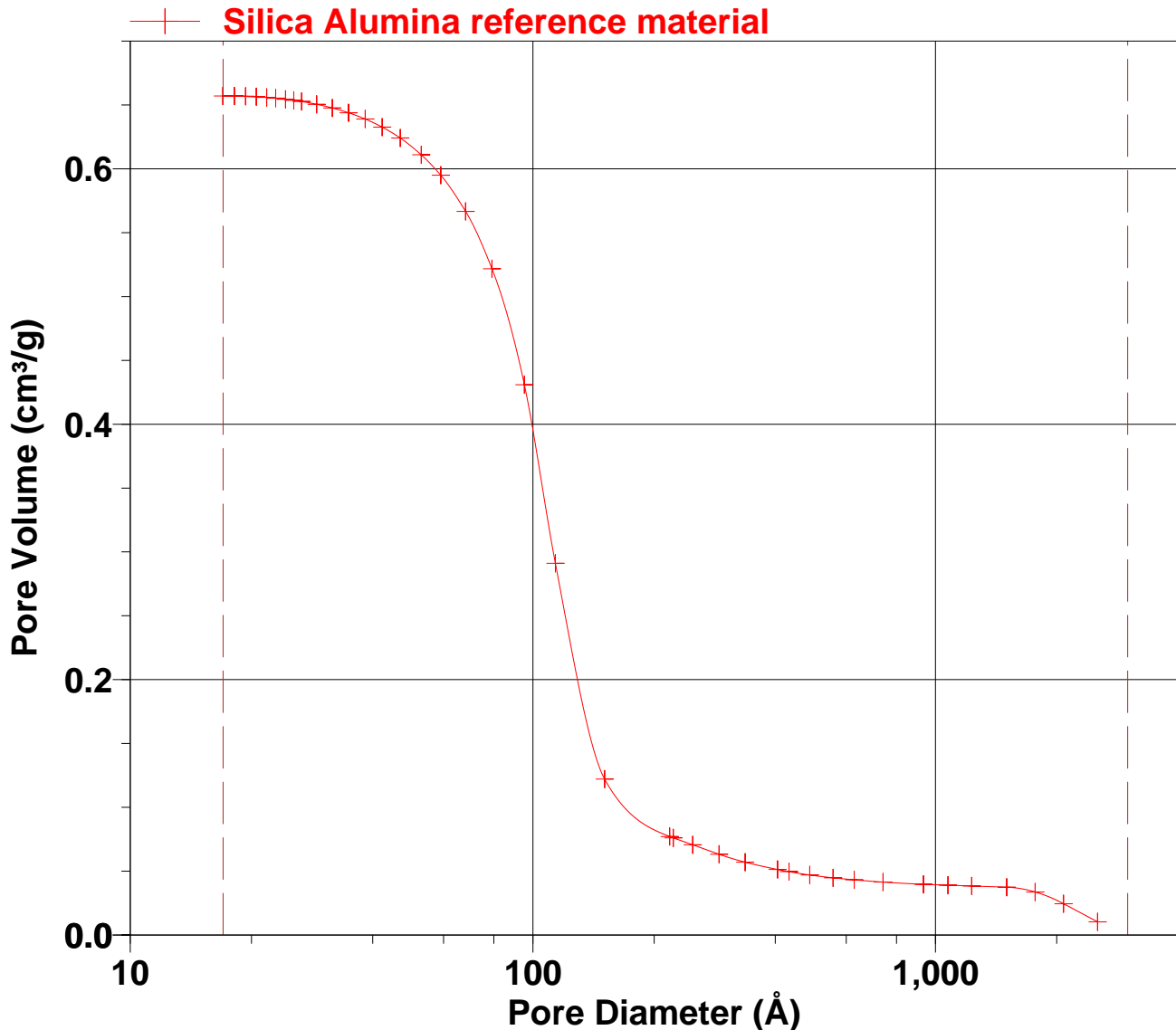
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BJH Adsorption Cumulative Pore Volume



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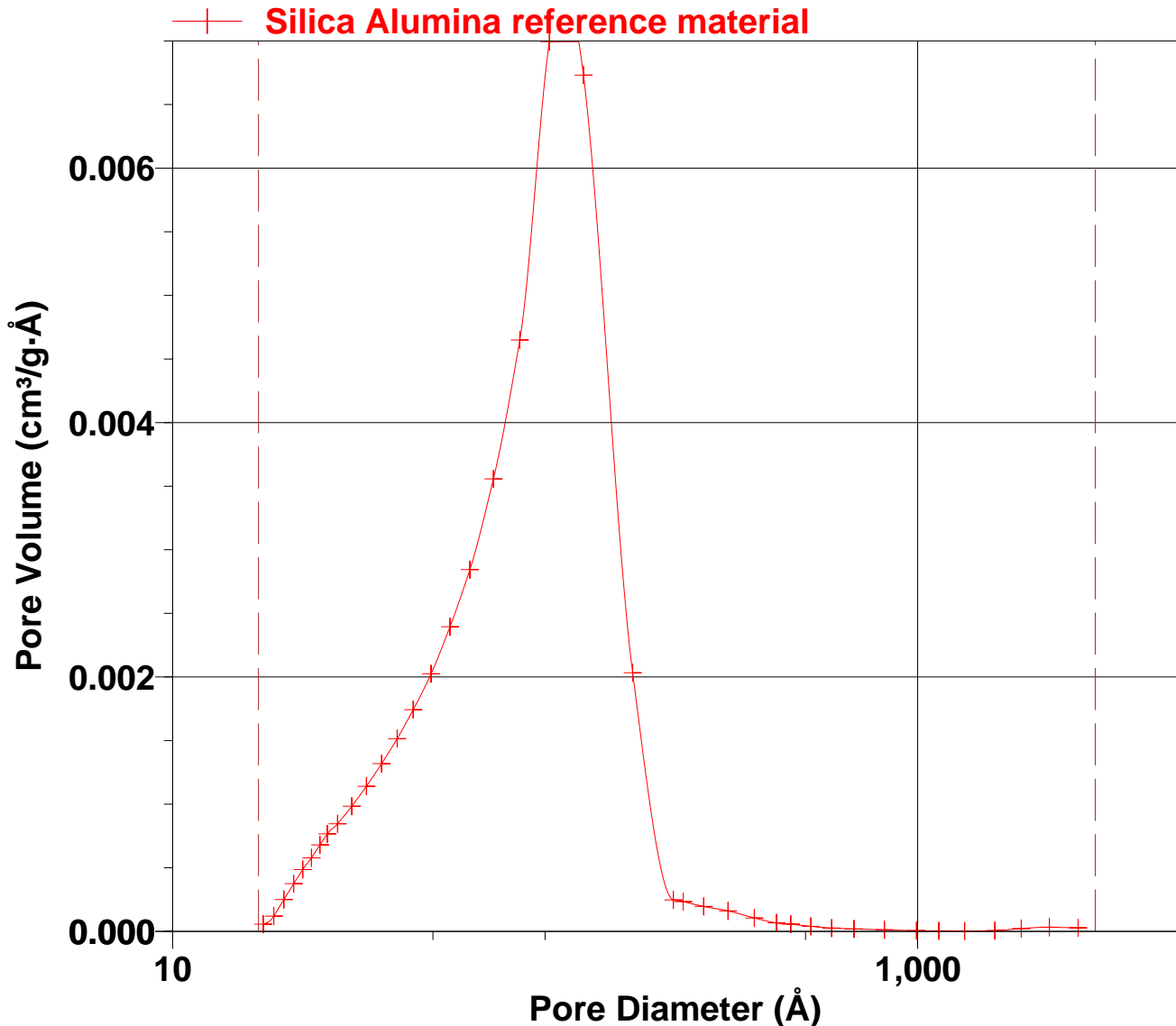
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BJH Adsorption dV/dD Pore Volume



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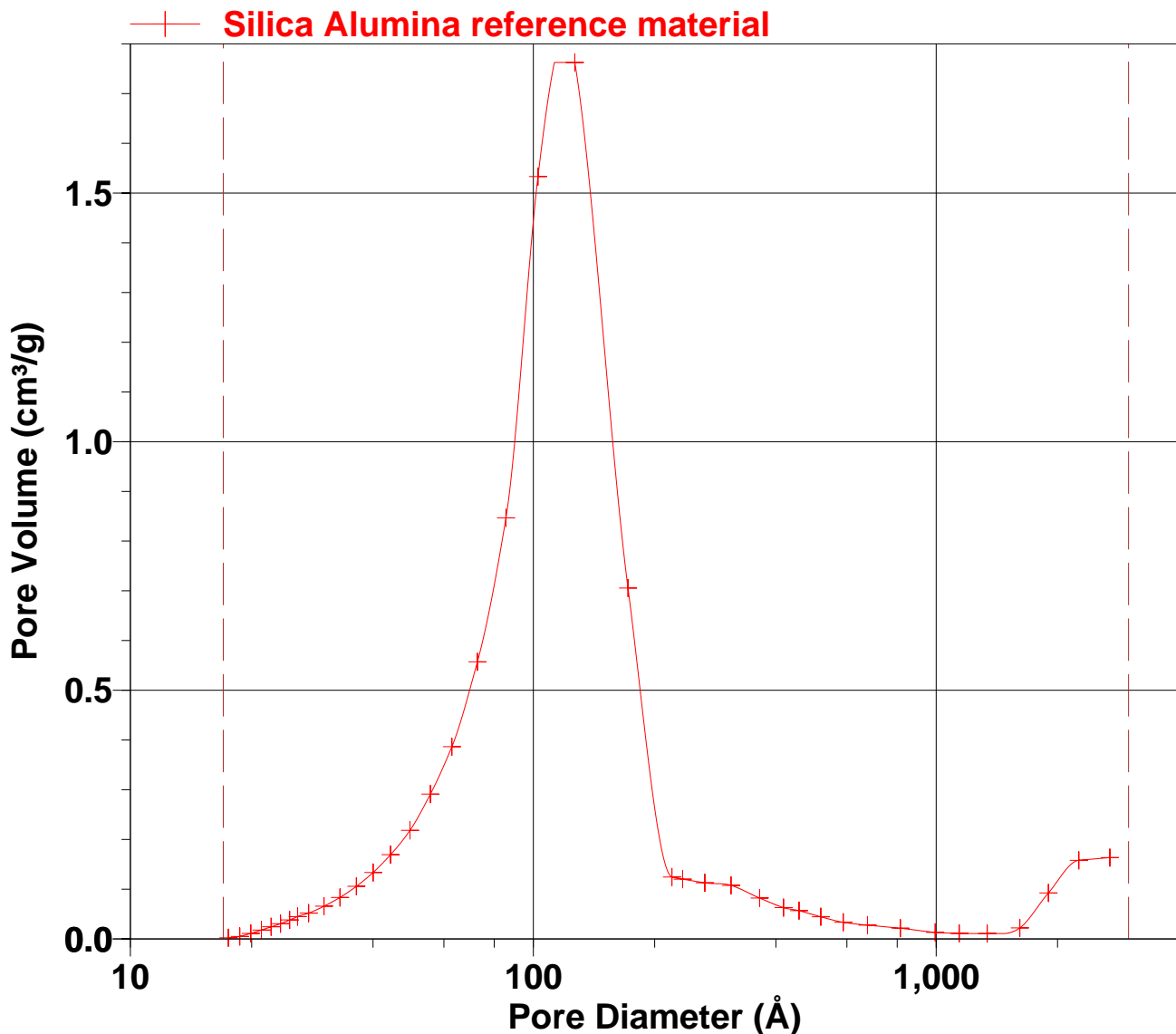
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BJH Adsorption dV/dlog(D) Pore Volume



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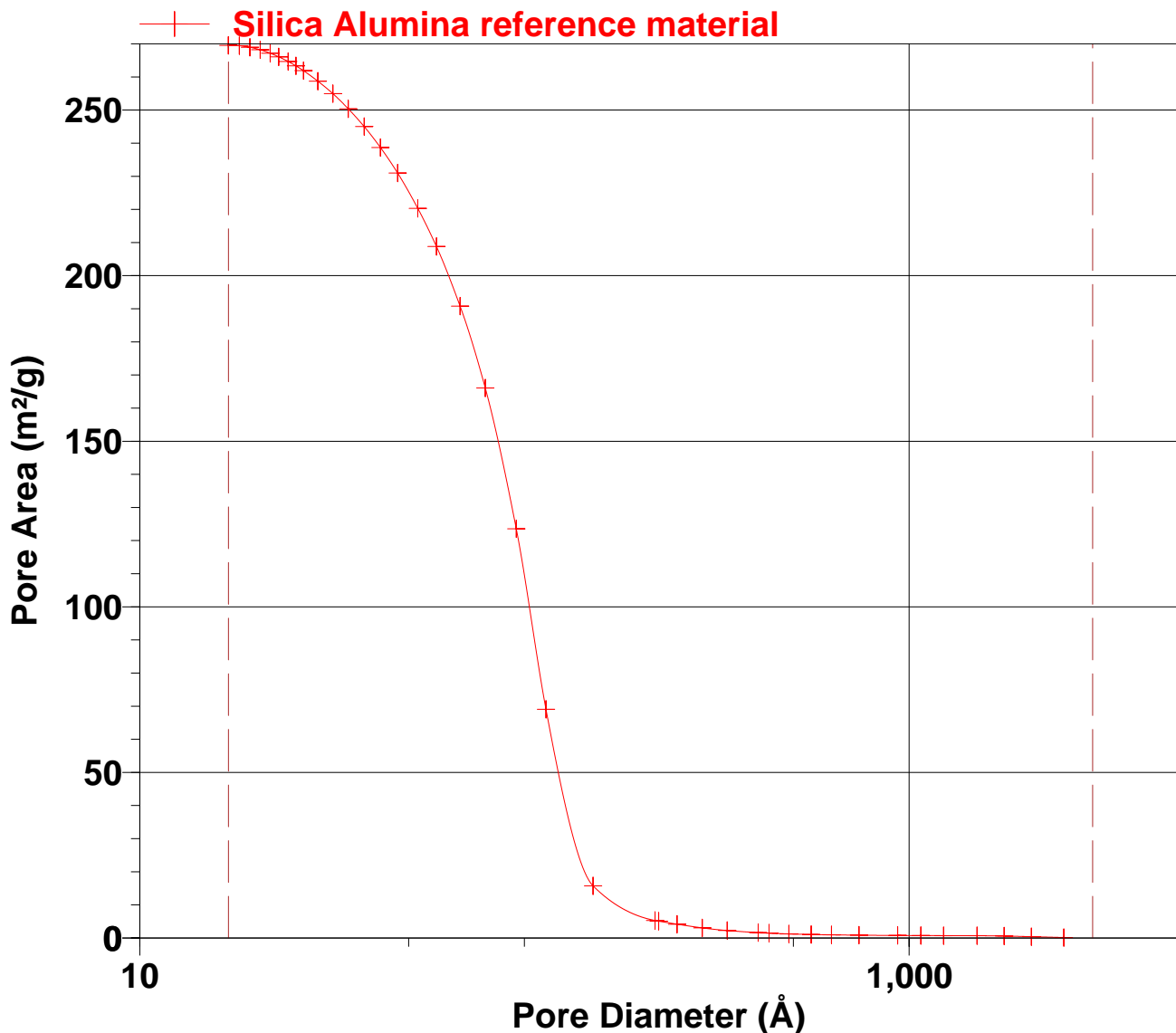
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BJH Adsorption Cumulative Pore Area



MICROMERITICS INSTRUMENT CORPORATION TRISTAR 3000

DEMO TriStar 3000 V6.04 A

Unit 1 Port 2

Serial #: 439

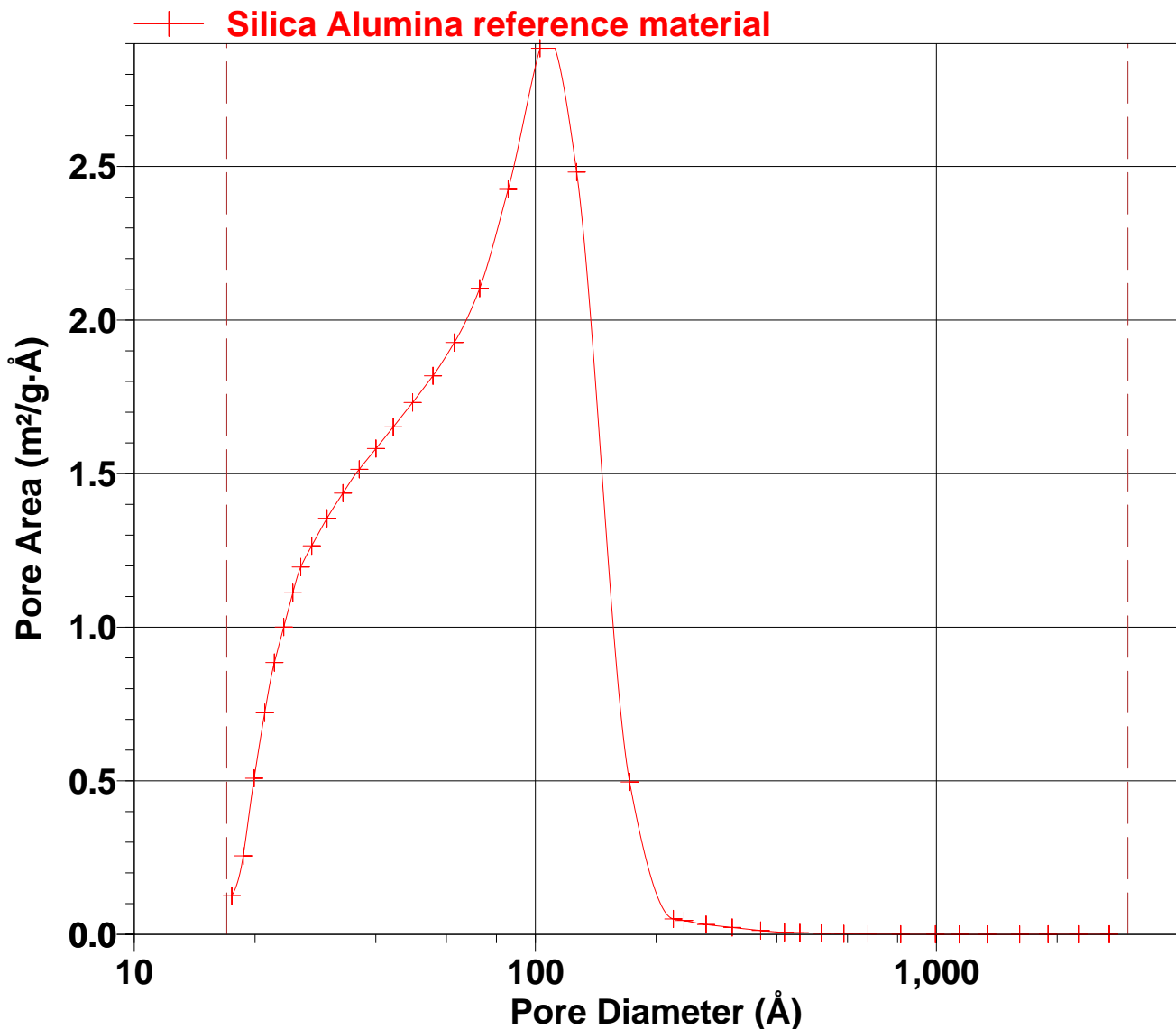
Page 13

Sample: Silica Alumina reference material
 Operator: Ana Medina
 Submitter: MIC,QA
 File: C:\DEMO3000\DATA\SIALREF.SMP

Started: 10/23/2002 8:31:01 AM	Analysis Adsorptive: N2
Completed: 10/24/2002 8:46:53 AM	Analysis Bath Temp.: 77.350 K
Report Time: 3/31/2006 2:43:25 PM	Sample Mass: 0.2940 g
Warm Free Space: 6.6083 cm ³ Measured	Cold Free Space: 20.2326 cm ³ Measured
Equilibration Interval: 10 s	Low Pressure Dose: None
Sample Density: 1.000 g/cm ³	Automatic Degas: Yes

Sample Prep: Stage	Soak Temperature (°C)	Ramp Rate (°C/min)	Soak Time (min)
1	90	10	60
2	350	10	960

BJH Adsorption dA/dD Pore Area



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DEMO TriStar 3000 V6.04 A

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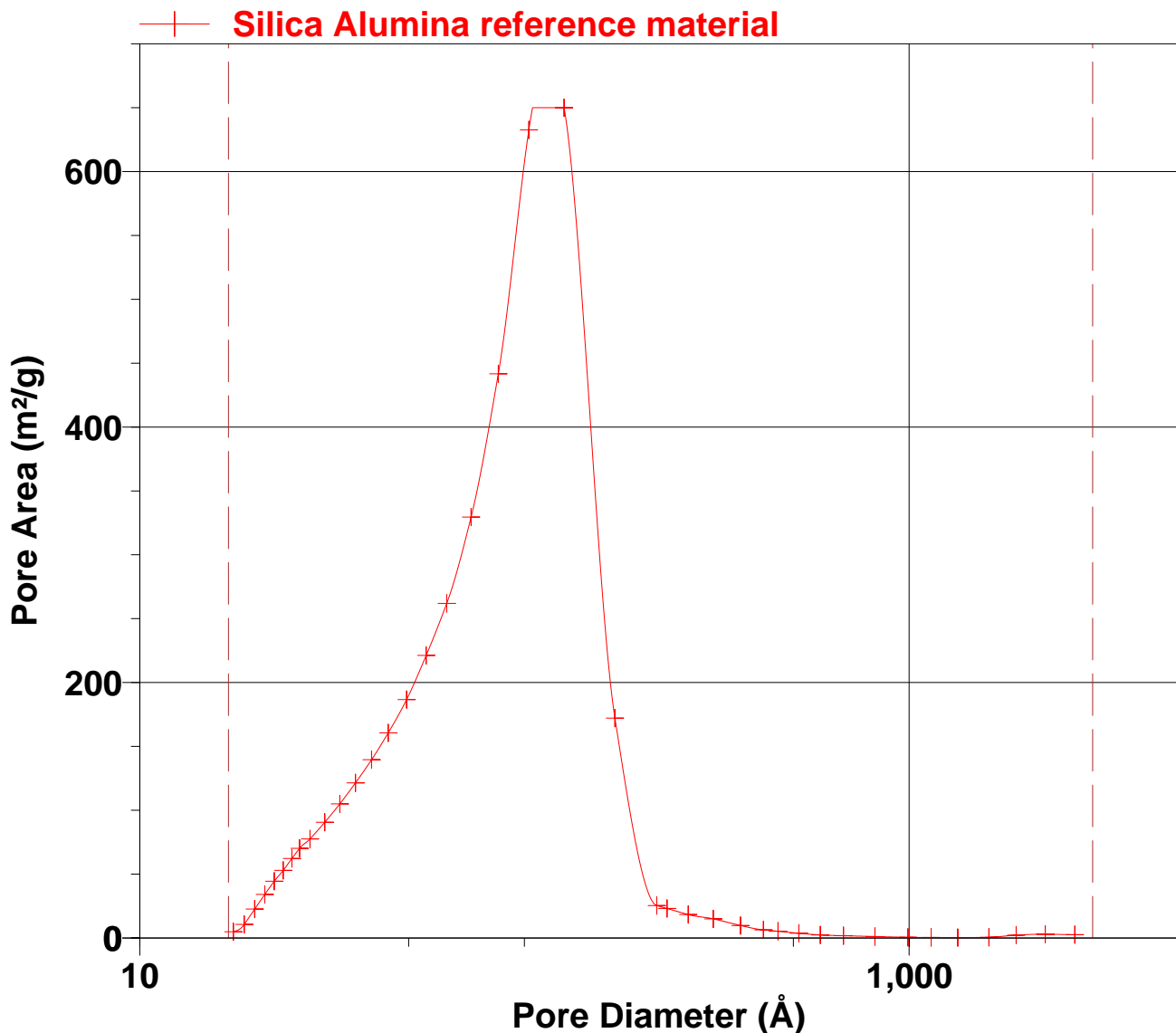
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BJH Adsorption dA/dlog(D) Pore Area



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DEMO TriStar 3000 V6.04 A

Unit 1 Port 2

Serial #: 439

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 Warm Free Space: 6.6083 cm³ Measured Cold Free Space: 20.2326 cm³ Measured
 Equilibration Interval: 10 s Low Pressure Dose: None
 Sample Density: 1.000 g/cm³ Automatic Degas: Yes

Sample Prep: Stage	Soak Temperature (°C)	Ramp Rate (°C/min)	Soak Time (min)
1	90	10	60
2	350	10	960

BJH Desorption Pore Distribution Report

$$t = 3.54 [-5 / \ln(P/P_0)] ^{0.333}$$

Diameter Range: 17.000 Å to 3000.000 Å

Adsorbate Property Factor: 9.53000 Å

Density Conversion Factor: 0.0015468

Fraction of Pores Open at Both Ends: 0.00

Pore Diameter Range (Å)	Average Diameter (Å)	Incremental Pore Volume (cm ³ /g)	Cumulative Pore Volume (cm ³ /g)	Incremental Pore Area (m ² /g)	Cumulative Pore Area (m ² /g)
3061.0 - 2883.8	2967.1	0.001121	0.001121	0.015	0.015
2883.8 - 2778.4	2829.1	0.001382	0.002503	0.020	0.035
2778.4 - 2516.2	2634.2	0.007549	0.010052	0.115	0.149
2516.2 - 1908.8	2129.8	0.144622	0.154674	2.716	2.865
1908.8 - 1523.9	1673.2	0.011788	0.166461	0.282	3.147
1523.9 - 1230.4	1345.8	0.000471	0.166932	0.014	3.161
1230.4 - 684.0	690.3	0.000052	0.166984	0.003	3.164
684.0 - 454.4	461.0	0.000049	0.167033	0.004	3.168
454.4 - 327.1	356.3	0.000089	0.167122	0.010	3.178
327.1 - 292.9	308.0	0.000107	0.167229	0.014	3.192
292.9 - 258.3	273.3	0.000192	0.167421	0.028	3.220
258.3 - 227.7	241.0	0.000269	0.167690	0.045	3.265
227.7 - 204.7	214.9	0.000295	0.167985	0.055	3.320
204.7 - 186.3	194.6	0.000347	0.168333	0.071	3.391
186.3 - 144.8	160.1	0.001292	0.169625	0.323	3.714
144.8 - 113.4	125.1	0.002064	0.171689	0.660	4.374
113.4 - 92.1	100.4	0.098194	0.269883	39.107	43.481
92.1 - 76.4	82.7	0.315025	0.584908	152.423	195.904
76.4 - 65.9	70.3	0.111972	0.696880	63.739	259.643
65.9 - 57.9	61.3	0.044120	0.740999	28.792	288.435
57.9 - 51.0	54.0	0.023765	0.764765	17.616	306.051
51.0 - 45.4	47.9	0.010869	0.775633	9.082	315.133
45.4 - 40.8	42.9	0.005703	0.781337	5.323	320.456
40.8 - 36.6	38.4	0.003268	0.784605	3.401	323.857
36.6 - 33.2	34.7	0.001517	0.786122	1.748	325.604
33.2 - 30.3	31.6	0.000531	0.786652	0.672	326.277

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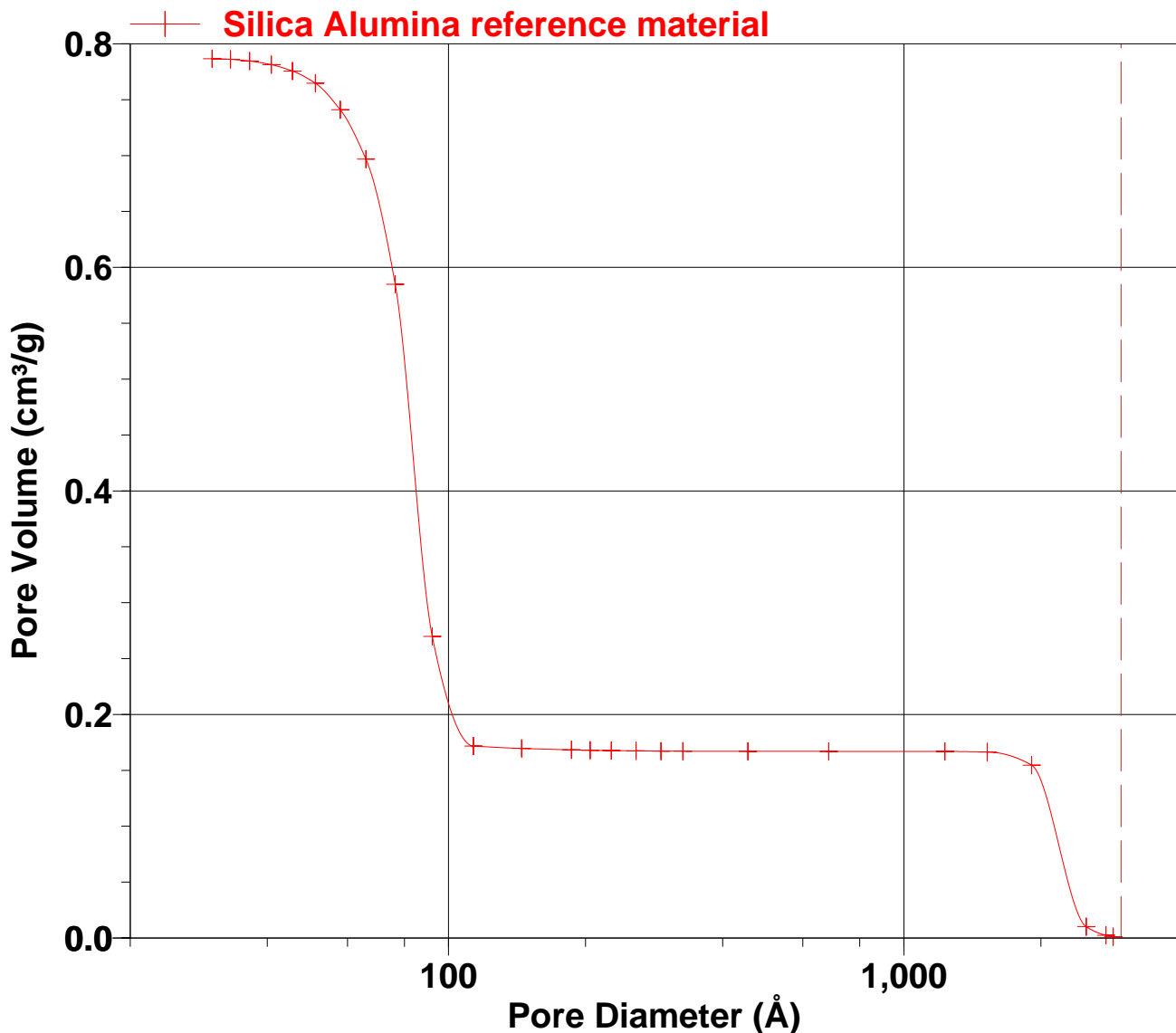
Page 16

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BJH Desorption Cumulative Pore Volume



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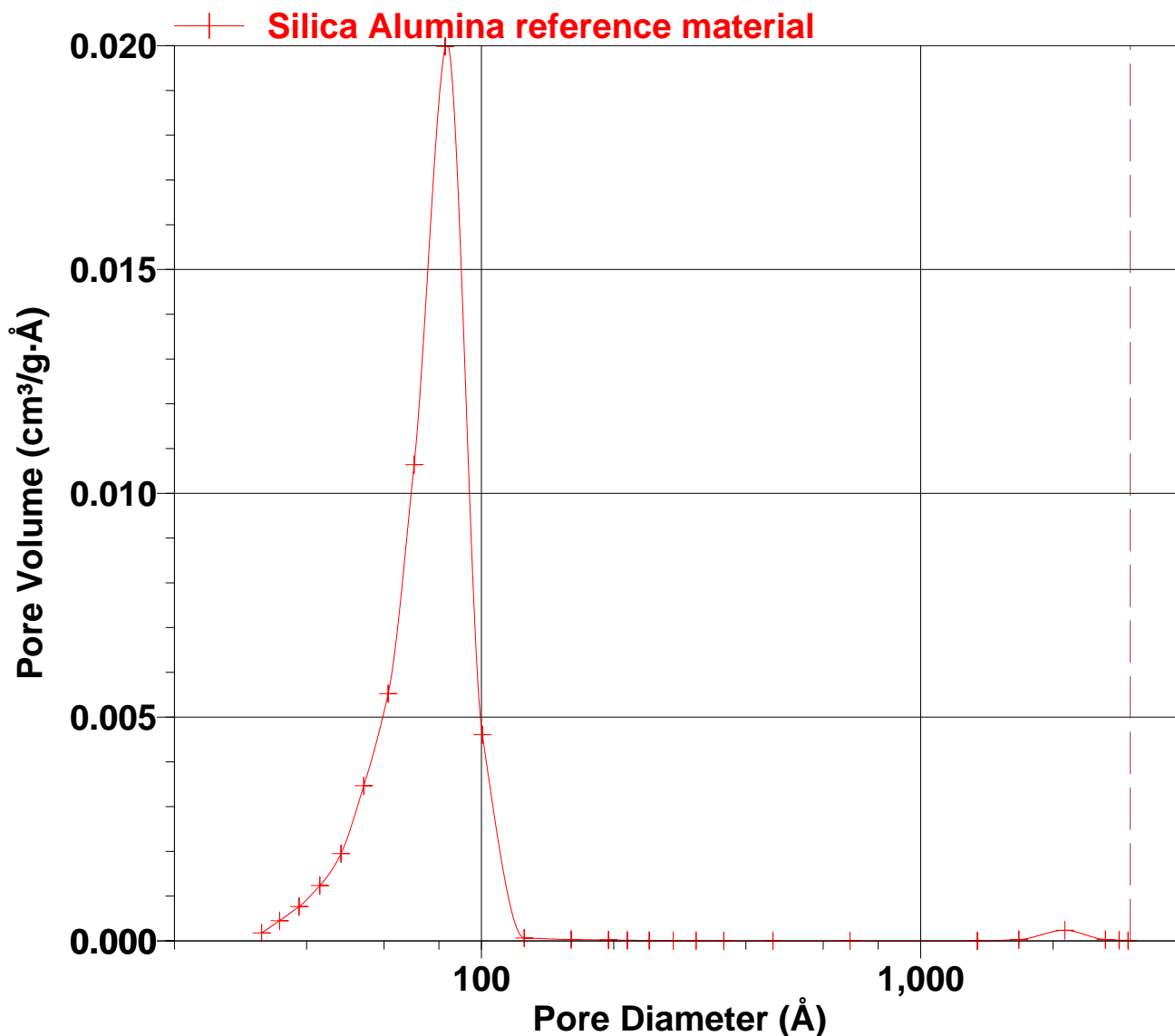
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BJH Desorption dV/dD Pore Volume



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DEMO TriStar 3000 V6.04 A

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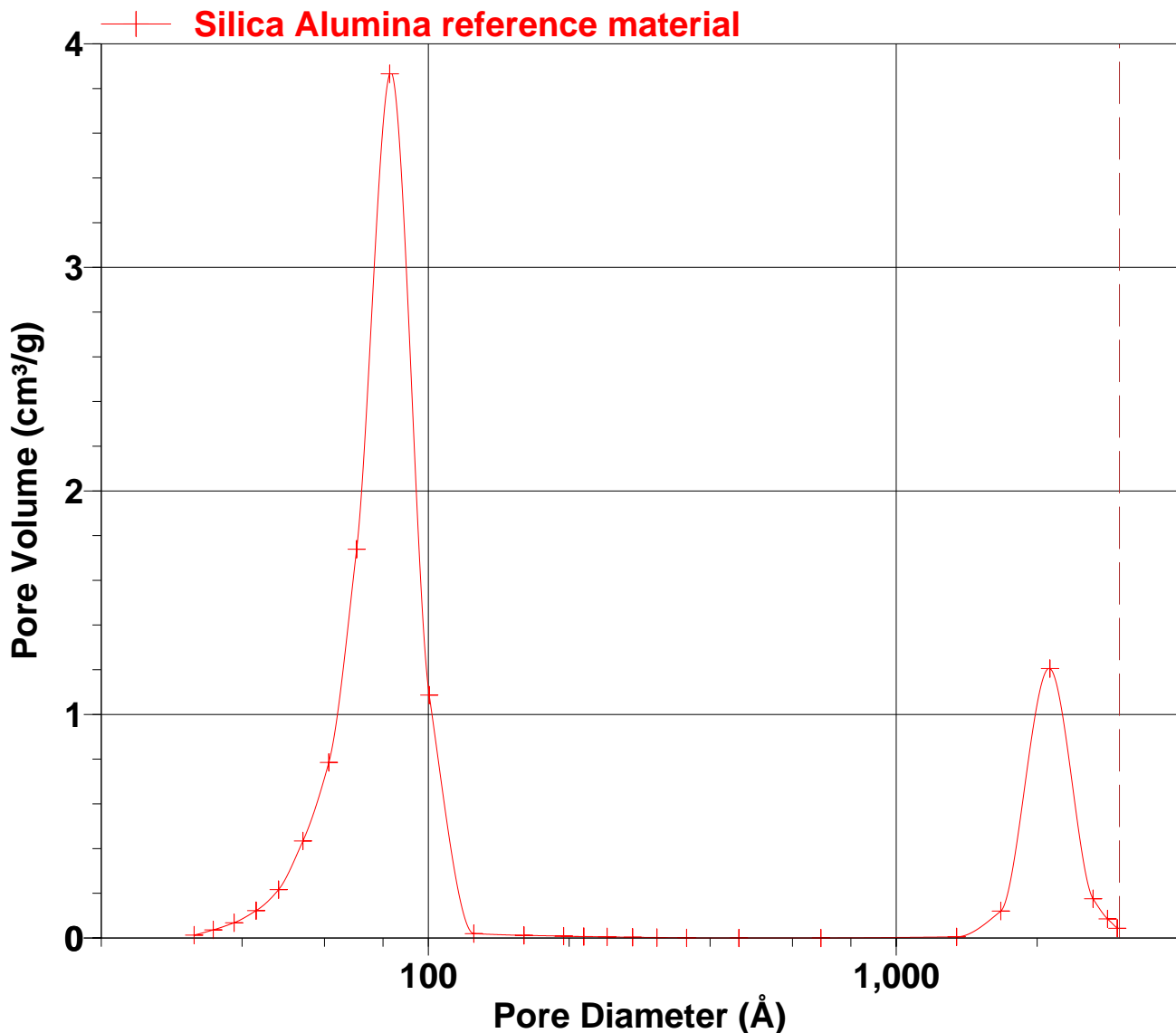
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BJH Desorption dV/dlog(D) Pore Volume



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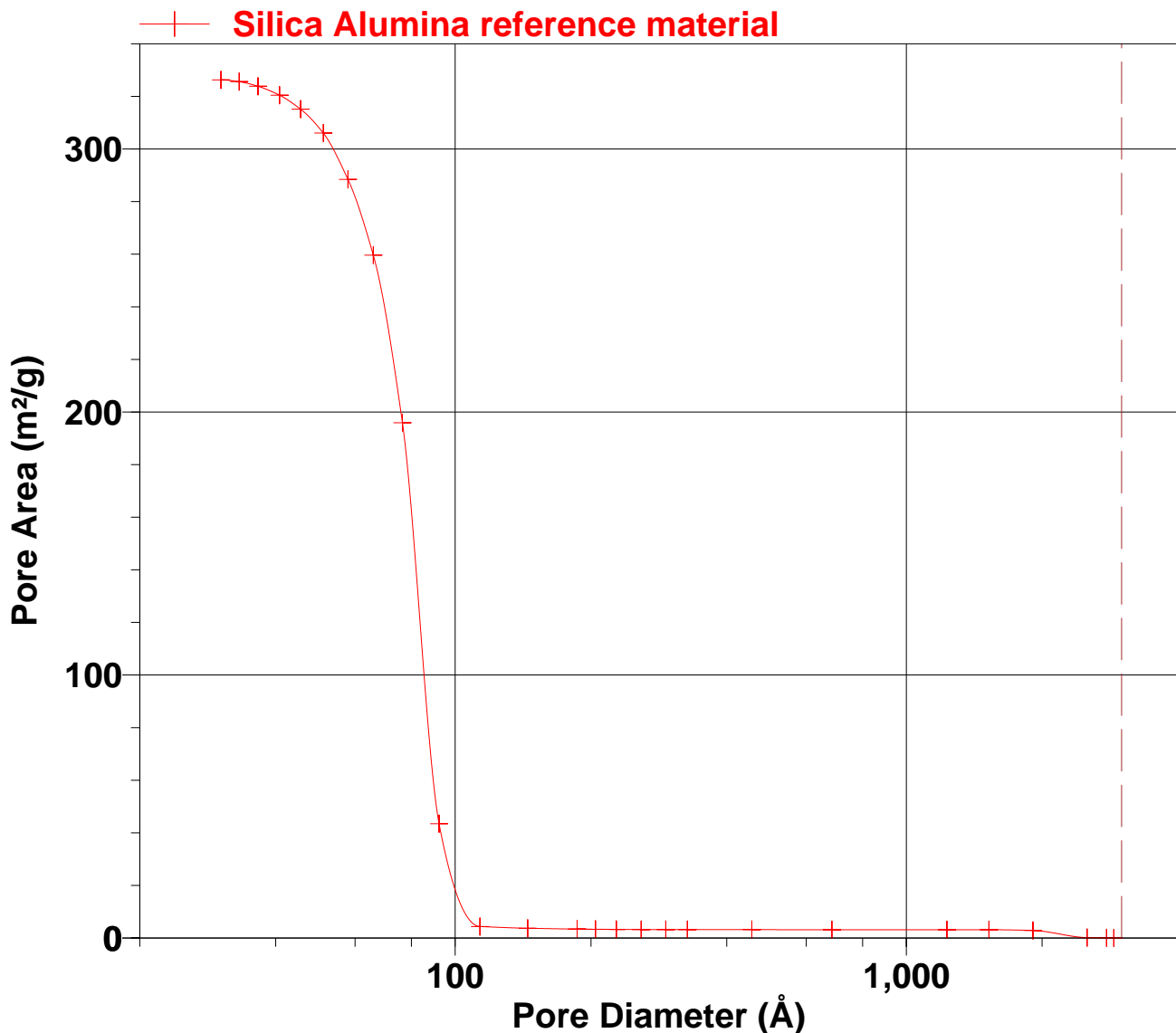
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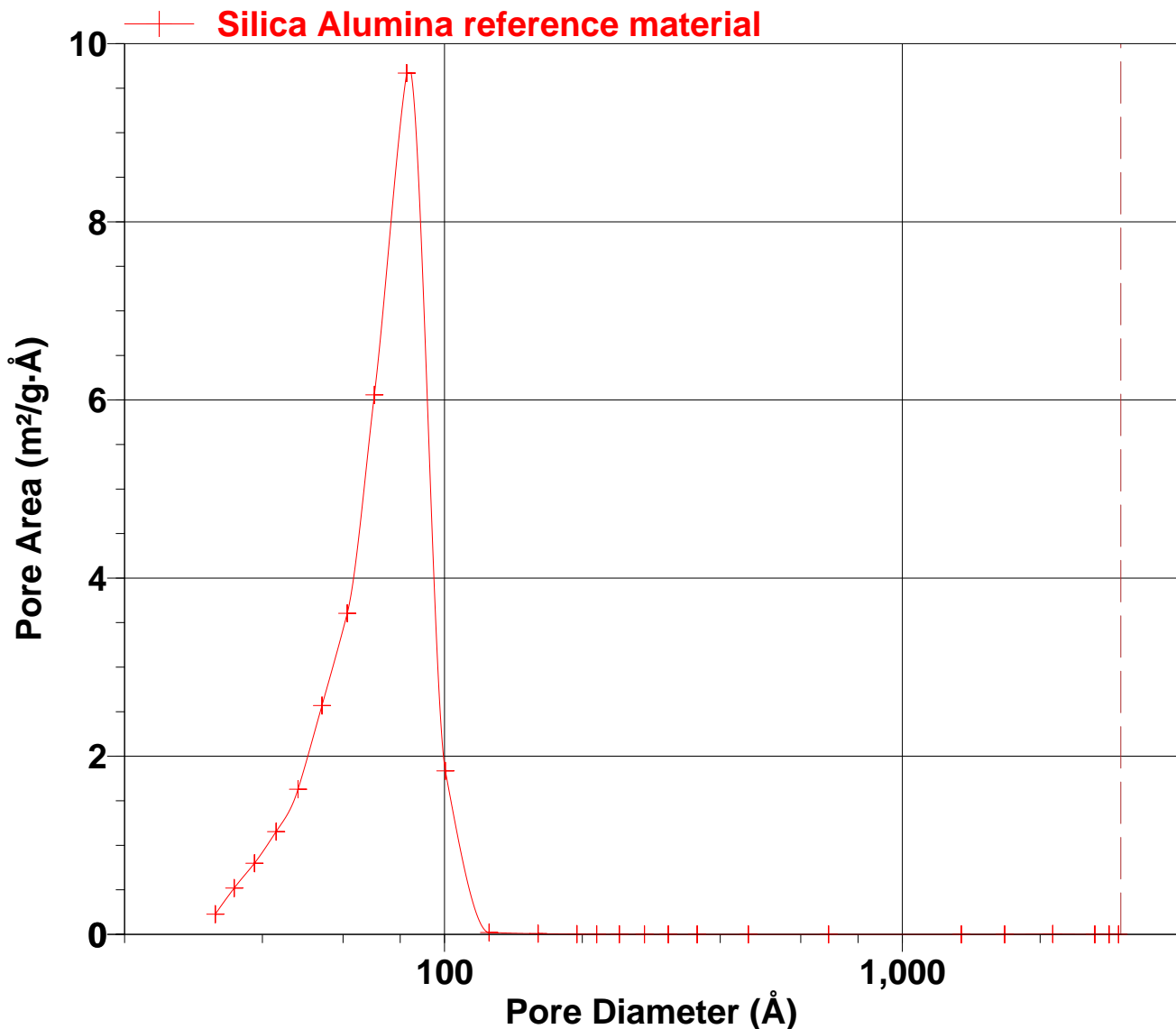
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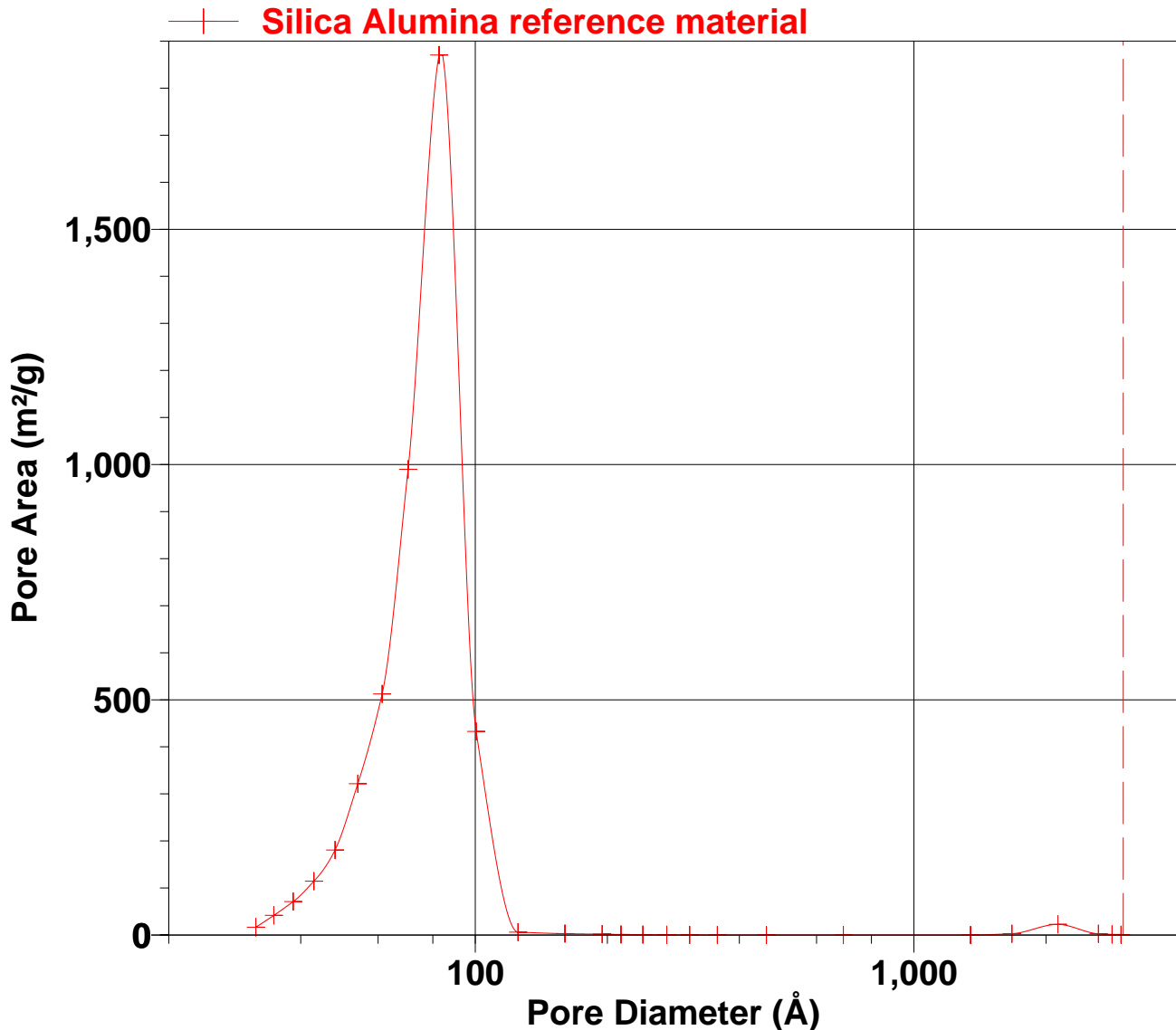
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BJH Desorption dA/dlog(D) Pore Area



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Summary Report

Surface Area

Single point surface area at P/Po = 0.297905308: 210.4023 m²/g

BET Surface Area: 215.4737 m²/g

t-Plot External Surface Area: 369.8255 m²/g

BJH Adsorption cumulative surface area of pores
 between 17.000 Å and 3000.000 Å diameter: 269.5065 m²/g

BJH Desorption cumulative surface area of pores
 between 17.000 Å and 3000.000 Å diameter: 326.2765 m²/g

Pore Volume

Single point desorption total pore volume of pores
 less than 2527.782 Å diameter at P/Po = 0.992302779: 0.774324 cm³/g

t-Plot micropore volume: -0.102012 cm³/g

BJH Adsorption cumulative volume of pores
 between 17.000 Å and 3000.000 Å diameter: 0.657076 cm³/g

BJH Desorption cumulative volume of pores
 between 17.000 Å and 3000.000 Å diameter: 0.786652 cm³/g

Pore Size

Desorption average pore width (4V/A by BET): 143.7435 Å

BJH Adsorption average pore diameter (4V/A): 97.523 Å

BJH Desorption average pore diameter (4V/A): 96.440 Å