

COMPANY NAME

MicroActive 5.00.03

TriStar II 3020 Version 3.02  
Serial # 888 Unit 1 Port 2

Page 1 of 13

File name: FILE NAME  
Chemist: Initials  
Submitter: Particle Technology Labs  
File: R:\Tristar II 3020...\Isotherm Report Example 2022.SMP

Started:	7/26/2022 3:03:18 PM	Analysis adsorptive:	N2
Completed:	7/26/2022 6:28:51 PM	Analysis bath temp.:	77.350 K
Report time:	12/14/2022 4:32:03 PM	Thermal correction:	No
Sample mass:	0.2183 g	Ambient free space:	13.7368 cm <sup>3</sup> Measured
Analysis free space:	41.9258 cm <sup>3</sup>	Equilibration interval:	10 s
Low pressure dose:	None	Sample density:	1.000 g/cm <sup>3</sup>
Automatic degas:	No		

Comments: Material Name - Sample ID - PTL Project # - Test Method # - PTL ID #

#### Summary Report

##### Surface Area

Single point surface area at  $p/p^\circ = 0.248224961$ : 193.5544 m<sup>2</sup>/g

BET Surface Area: 198.4666 m<sup>2</sup>/g

BJH Adsorption cumulative surface area of pores  
between 1.7000 nm and 300.0000 nm width: 299.4870 m<sup>2</sup>/g

BJH Desorption cumulative surface area of pores  
between 1.7000 nm and 300.0000 nm width: 298.4706 m<sup>2</sup>/g

##### Pore Volume

BJH Adsorption cumulative volume of pores  
between 1.7000 nm and 300.0000 nm width: 0.603431 cm<sup>3</sup>/g

BJH Desorption cumulative volume of pores  
between 1.7000 nm and 300.0000 nm width: 0.603941 cm<sup>3</sup>/g

##### Pore Size

BJH Adsorption average pore width (4V/A): 8.0595 nm

BJH Desorption average pore width (4V/A): 8.0938 nm



COMPANY NAME

MicroActive 5.00.03

TriStar II 3020 Version 3.02  
Serial # 888 Unit 1 Port 2

Page 2 of 13

File name: FILE NAME  
 Chemist: Initials  
 Submitter: Particle Technology Labs  
 File: R:\Tristar II 3020...\Isotherm Report Example 2022.SMP

Started: 7/26/2022 3:03:18 PM	Analysis adsorptive: N2
Completed: 7/26/2022 6:28:51 PM	Analysis bath temp.: 77.350 K
Report time: 12/14/2022 4:32:03 PM	Thermal correction: No
Sample mass: 0.2183 g	Ambient free space: 13.7368 cm <sup>3</sup> Measured
Analysis free space: 41.9258 cm <sup>3</sup>	Equilibration interval: 10 s
Low pressure dose: None	Sample density: 1.000 g/cm <sup>3</sup>
Automatic degas: No	

Comments: Material Name - Sample ID - PTL Project # - Test Method # - PTL ID #

Isotherm Tabular Report

Relative Pressure (p/p°)	Absolute Pressure (mmHg)	Quantity Adsorbed (cm <sup>3</sup> /g STP)	Elapsed Time (h:min)	Saturation Pressure (mmHg)
			00:35	745.786438
0.051429747	38.348351	41.9946	00:41	745.645325
0.079419325	59.226467	45.2146	00:44	745.743774
0.098649517	73.571587	47.0861	00:47	745.787598
0.146913496	109.565277	51.2164	00:50	745.780884
0.197462182	147.269089	55.2079	00:53	745.809082
0.248224961	185.121628	59.1519	00:57	745.781677
0.299138757	223.085083	63.2073	01:00	745.757874
0.397199013	296.212158	71.7197	01:04	745.752502
0.597817491	445.817505	96.9042	01:11	745.741821
0.802659688	598.380005	205.2769	01:29	745.496521
0.984260558	733.663879	385.2365	01:51	745.395996
0.994734470	741.417542	388.4958	01:56	745.342163
0.982907533	732.546814	386.9644	01:59	745.285583
0.888436079	662.094299	370.3018	02:07	745.235718
0.785772120	585.514038	276.2013	02:25	745.144836
0.691037444	514.884644	128.7808	02:49	745.089355
0.560352153	417.461670	89.9373	02:58	744.998779
0.493789150	367.898987	81.0675	03:03	745.052795
0.394612079	294.021332	70.8208	03:08	745.089539
0.291879831	217.455444	62.0282	03:13	745.017029
0.192722914	143.586746	54.3086	03:18	745.042419
0.101186272	75.387917	46.8047	03:24	745.040955

COMPANY NAME

MicroActive 5.00.03

TriStar II 3020 Version 3.02  
Serial # 888 Unit 1 Port 2

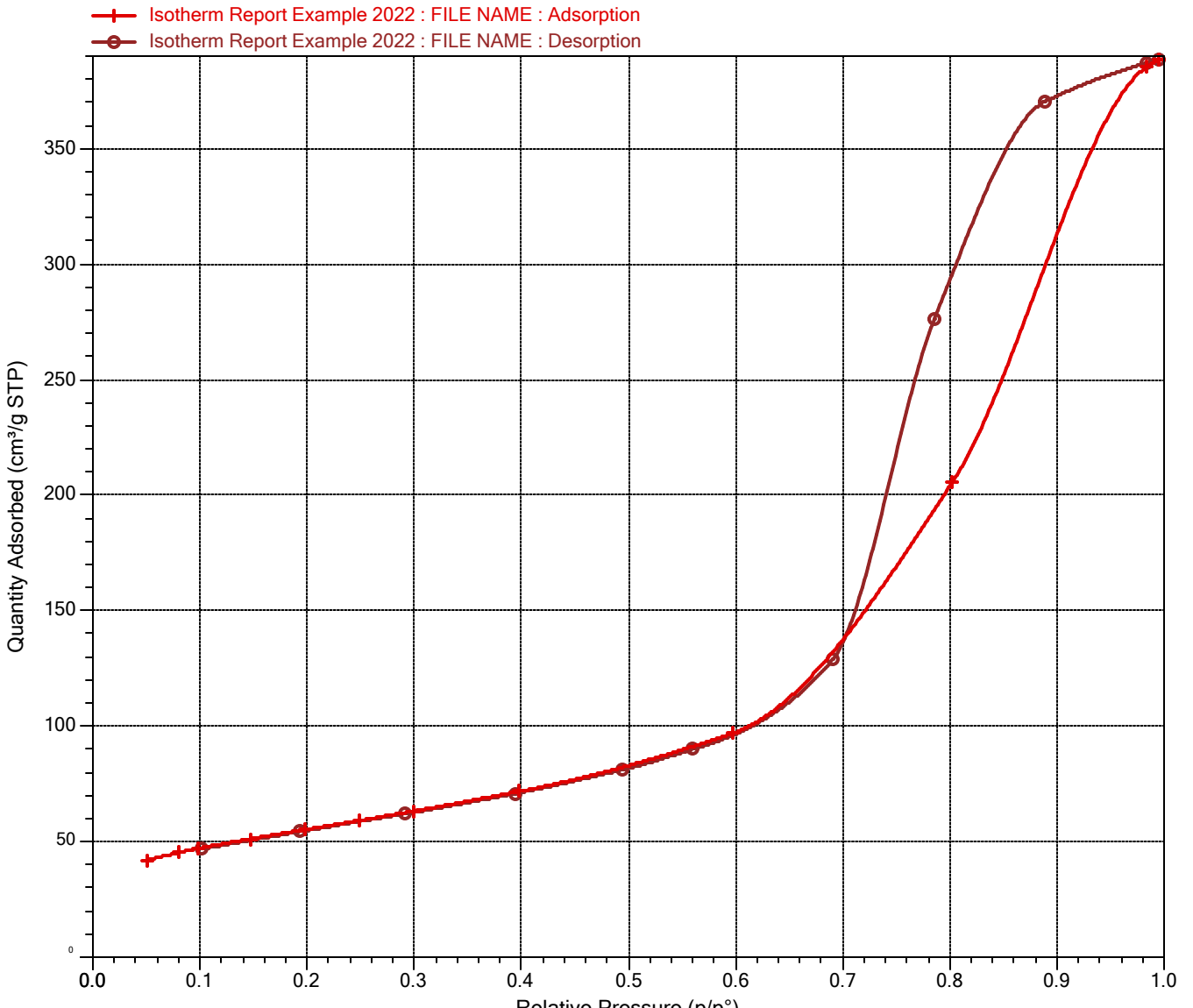
Page 3 of 13

File name: FILE NAME  
Chemist: Initials  
Submitter: Particle Technology Labs  
File: R:\Tristar II 3020...\Isotherm Report Example 2022.SMP

Started: 7/26/2022 3:03:18 PM	Analysis adsorptive: N2
Completed: 7/26/2022 6:28:51 PM	Analysis bath temp.: 77.350 K
Report time: 12/14/2022 4:32:03 PM	Thermal correction: No
Sample mass: 0.2183 g	Ambient free space: 13.7368 cm <sup>3</sup> Measured
Analysis free space: 41.9258 cm <sup>3</sup>	Equilibration interval: 10 s
Low pressure dose: None	Sample density: 1.000 g/cm <sup>3</sup>
Automatic degas: No	

Comments: Material Name - Sample ID - PTL Project # - Test Method # - PTL ID #

### Isotherm Linear Plot





COMPANY NAME

MicroActive 5.00.03

TriStar II 3020 Version 3.02  
Serial # 888 Unit 1 Port 2

Page 4 of 13

File name: FILE NAME  
Chemist: Initials  
Submitter: Particle Technology Labs  
File: R:\Tristar II 3020...\Isotherm Report Example 2022.SMP

Started:	7/26/2022 3:03:18 PM	Analysis adsorptive:	N2
Completed:	7/26/2022 6:28:51 PM	Analysis bath temp.:	77.350 K
Report time:	12/14/2022 4:32:03 PM	Thermal correction:	No
Sample mass:	0.2183 g	Ambient free space:	13.7368 cm <sup>3</sup> Measured
Analysis free space:	41.9258 cm <sup>3</sup>	Equilibration interval:	10 s
Low pressure dose:	None	Sample density:	1.000 g/cm <sup>3</sup>
Automatic degas:	No		

Comments: Material Name - Sample ID - PTL Project # - Test Method # - PTL ID #

#### BET Report

BET surface area: 198.4666 ± 0.5786 m<sup>2</sup>/g  
Slope: 0.021760 ± 0.000063 g/cm<sup>3</sup> STP  
Y-intercept: 0.000171 ± 0.000010 g/cm<sup>3</sup> STP  
C: 128.089646  
Qm: 45.5975 cm<sup>3</sup>/g STP  
Correlation coefficient: 0.9999874  
Molecular cross-sectional area: 0.1620 nm<sup>2</sup>

Relative Pressure (p/p <sup>o</sup> )	Quantity Adsorbed (cm <sup>3</sup> /g STP)	1/[Q(p <sup>o</sup> /p - 1)]
0.051429747	41.9946	0.001291
0.098649517	47.0861	0.002324
0.146913496	51.2164	0.003362
0.197462182	55.2079	0.004457
0.248224961	59.1519	0.005582

COMPANY NAME

MicroActive 5.00.03

TriStar II 3020 Version 3.02  
Serial # 888 Unit 1 Port 2

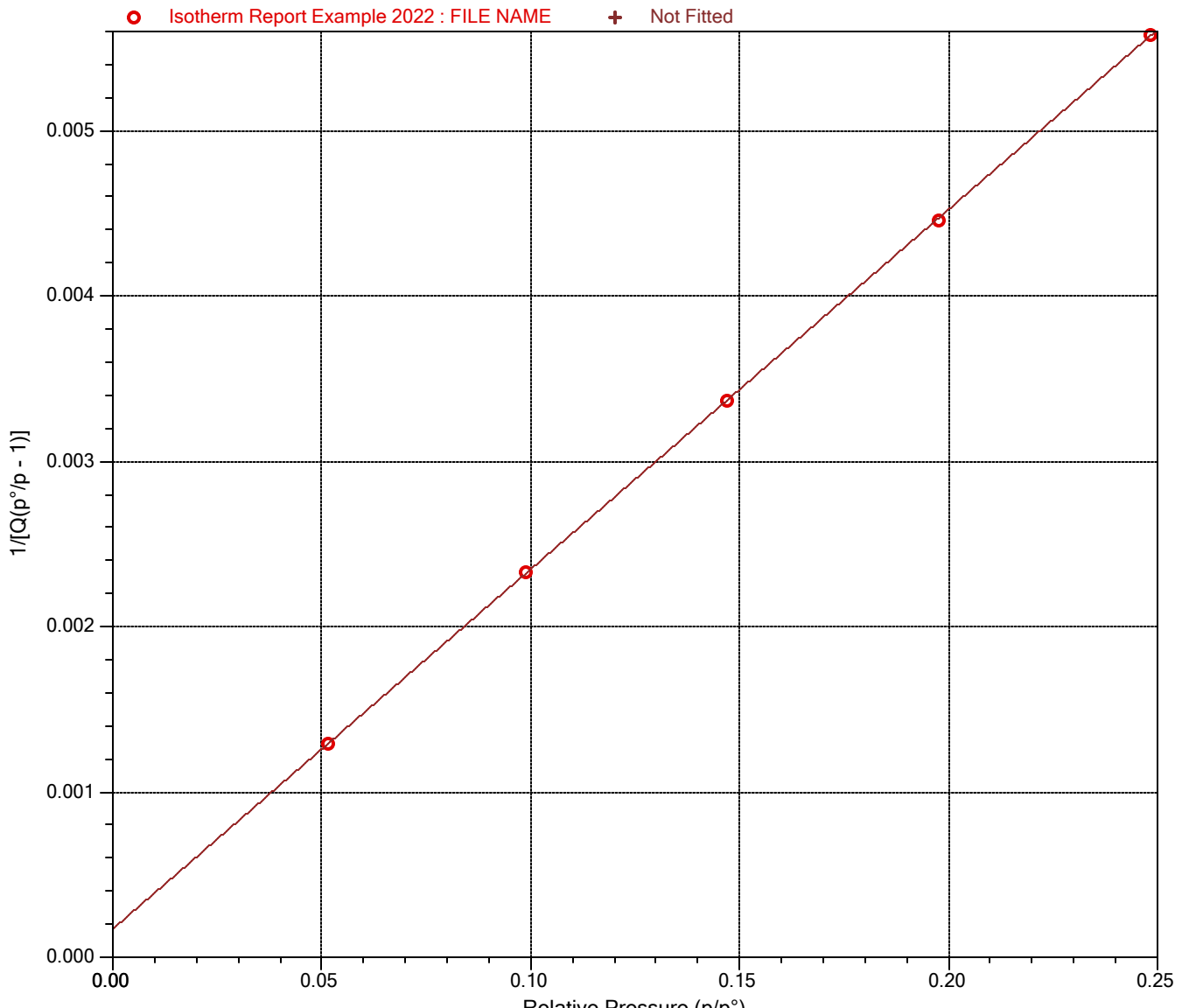
Page 5 of 13

File name: FILE NAME  
Chemist: Initials  
Submitter: Particle Technology Labs  
File: R:\Tristar II 3020...\Isotherm Report Example 2022.SMP

Started:	7/26/2022 3:03:18 PM	Analysis adsorptive:	N2
Completed:	7/26/2022 6:28:51 PM	Analysis bath temp.:	77.350 K
Report time:	12/14/2022 4:32:03 PM	Thermal correction:	No
Sample mass:	0.2183 g	Ambient free space:	13.7368 cm <sup>3</sup> Measured
Analysis free space:	41.9258 cm <sup>3</sup>	Equilibration interval:	10 s
Low pressure dose:	None	Sample density:	1.000 g/cm <sup>3</sup>
Automatic degas:	No		

Comments: Material Name - Sample ID - PTL Project # - Test Method # - PTL ID #

### BET Surface Area Plot





COMPANY NAME

MicroActive 5.00.03

TriStar II 3020 Version 3.02  
Serial # 888 Unit 1 Port 2

Page 6 of 13

File name: FILE NAME  
 Chemist: Initials  
 Submitter: Particle Technology Labs  
 File: R:\Tristar II 3020...\Isotherm Report Example 2022.SMP

Started:	7/26/2022 3:03:18 PM	Analysis adsorptive:	N2
Completed:	7/26/2022 6:28:51 PM	Analysis bath temp.:	77.350 K
Report time:	12/14/2022 4:32:03 PM	Thermal correction:	No
Sample mass:	0.2183 g	Ambient free space:	13.7368 cm <sup>3</sup> Measured
Analysis free space:	41.9258 cm <sup>3</sup>	Equilibration interval:	10 s
Low pressure dose:	None	Sample density:	1.000 g/cm <sup>3</sup>
Automatic degas:	No		

Comments: Material Name - Sample ID - PTL Project # - Test Method # - PTL ID #

BJH Adsorption Pore Distribution Report

Faas Correction

Halsey

$$t = 3.54 [ -5 / \ln(p/p^0) ] ^ 0.333$$

Width range: 1.7000 to 300.0000 nm  
 Adsorbate property factor: 0.95300 nm  
 Density conversion factor: 0.0015468  
 Fraction of pores open at both ends: 0.00

Pore Width Range (nm)	Average Width (nm)	Incremental Pore Volume (cm <sup>3</sup> /g)	Cumulative Pore Volume (cm <sup>3</sup> /g)	Incremental Pore Area (m <sup>2</sup> /g)	Cumulative Pore Area (m <sup>2</sup> /g)
367.5 - 124.5	148.8	0.005351	0.005351	0.144	0.144
124.5 - 10.2	10.9	0.379739	0.385090	139.914	140.058
10.2 - 4.8	5.6	0.209061	0.594150	148.281	288.339
4.8 - 2.9	3.3	0.009280	0.603431	11.148	299.487

COMPANY NAME

MicroActive 5.00.03

TriStar II 3020 Version 3.02  
Serial # 888 Unit 1 Port 2

Page 7 of 13

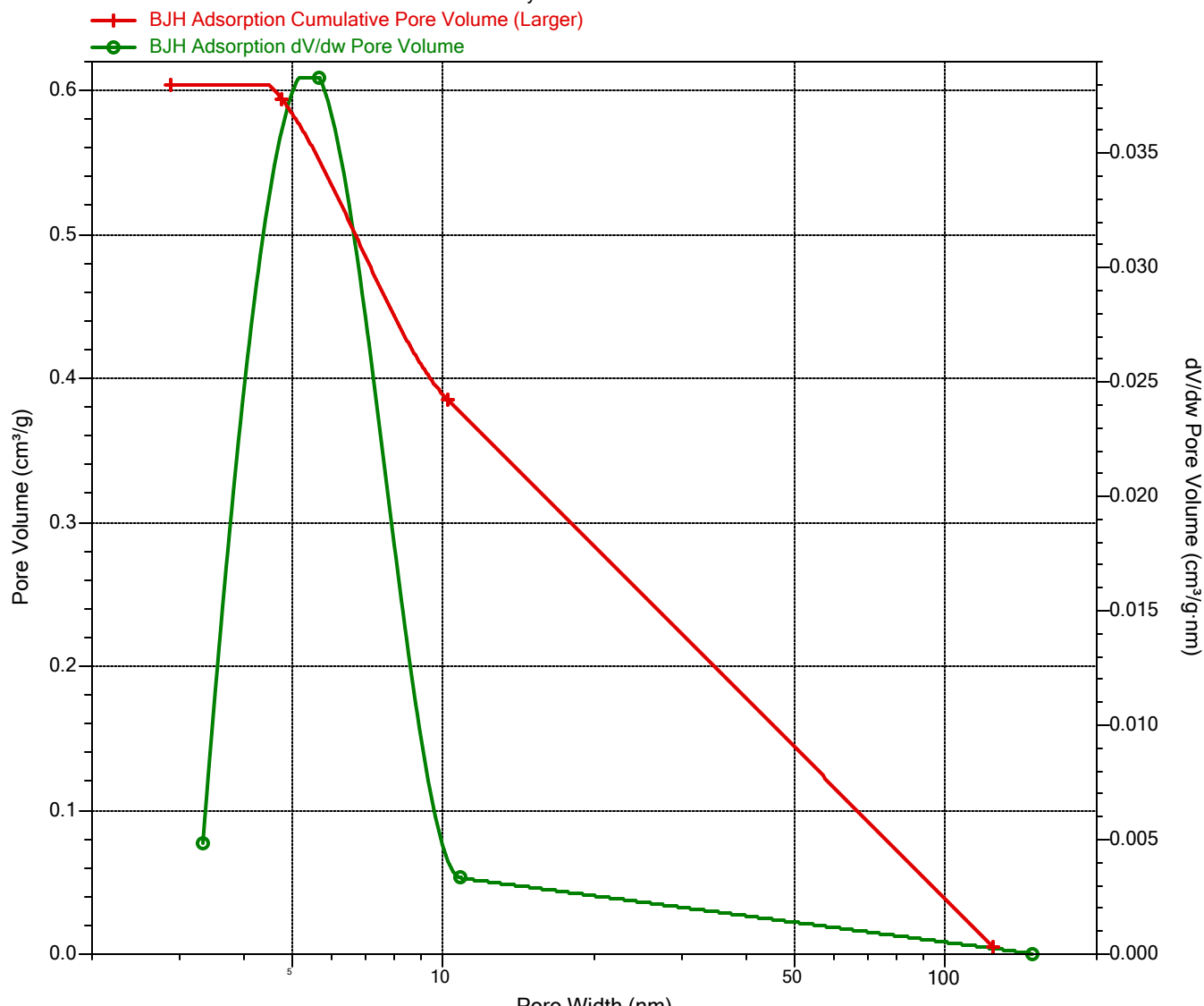
File name: FILE NAME  
Chemist: Initials  
Submitter: Particle Technology Labs  
File: R:\Tristar II 3020...\Isotherm Report Example 2022.SMP

Started: 7/26/2022 3:03:18 PM	Analysis adsorptive: N2
Completed: 7/26/2022 6:28:51 PM	Analysis bath temp.: 77.350 K
Report time: 12/14/2022 4:32:03 PM	Thermal correction: No
Sample mass: 0.2183 g	Ambient free space: 13.7368 cm <sup>3</sup> Measured
Analysis free space: 41.9258 cm <sup>3</sup>	Equilibration interval: 10 s
Low pressure dose: None	Sample density: 1.000 g/cm <sup>3</sup>
Automatic degas: No	

Comments: Material Name - Sample ID - PTL Project # - Test Method # - PTL ID #

### BJH Adsorption Cumulative Pore Volume (Larger)

Halsey : Faas Correction



COMPANY NAME

MicroActive 5.00.03

TriStar II 3020 Version 3.02  
Serial # 888 Unit 1 Port 2

Page 8 of 13

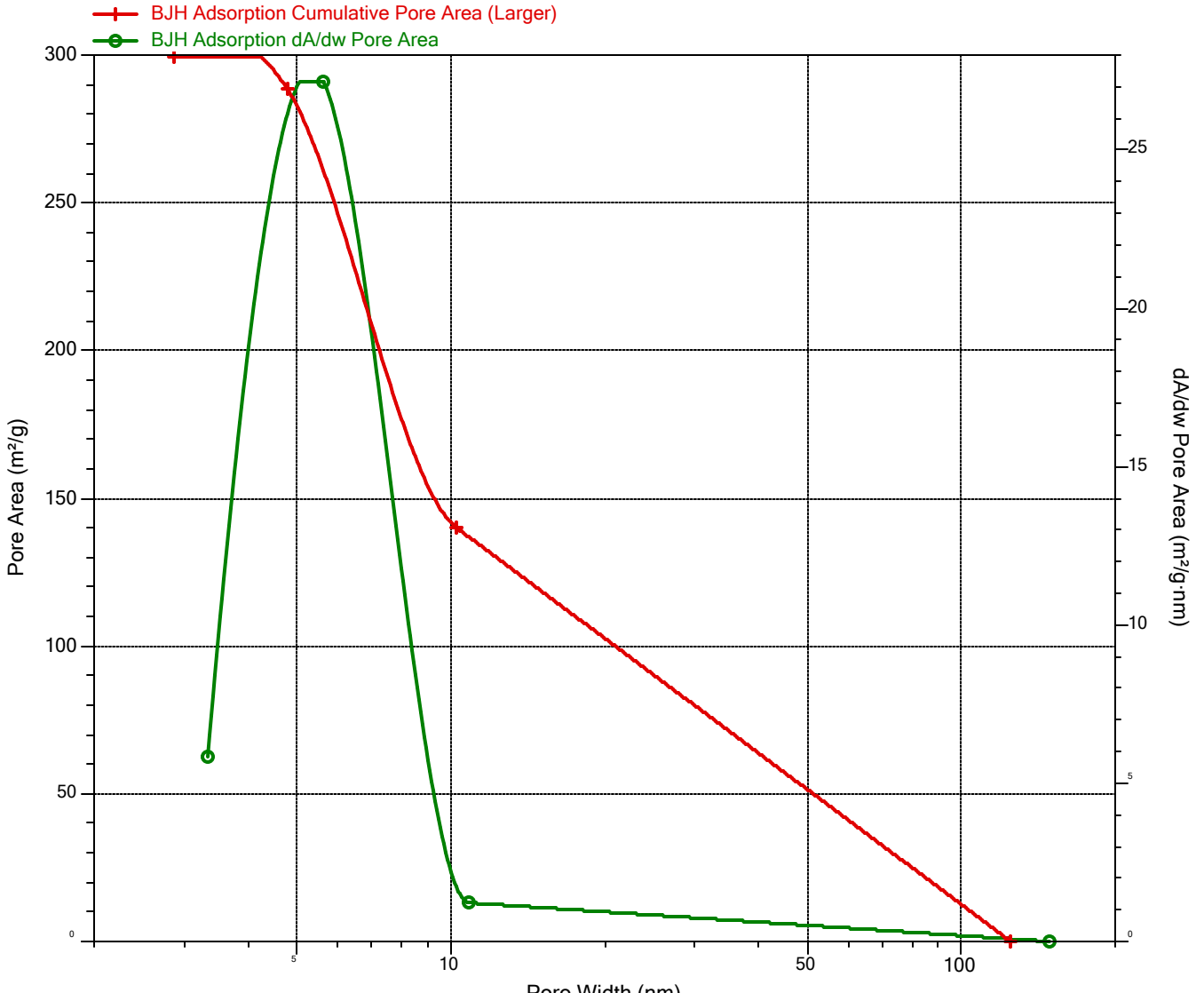
File name: FILE NAME  
Chemist: Initials  
Submitter: Particle Technology Labs  
File: R:\Tristar II 3020...\Isotherm Report Example 2022.SMP

Started:	7/26/2022 3:03:18 PM	Analysis adsorptive:	N2
Completed:	7/26/2022 6:28:51 PM	Analysis bath temp.:	77.350 K
Report time:	12/14/2022 4:32:03 PM	Thermal correction:	No
Sample mass:	0.2183 g	Ambient free space:	13.7368 cm <sup>3</sup> Measured
Analysis free space:	41.9258 cm <sup>3</sup>	Equilibration interval:	10 s
Low pressure dose:	None	Sample density:	1.000 g/cm <sup>3</sup>
Automatic degas:	No		

Comments: Material Name - Sample ID - PTL Project # - Test Method # - PTL ID #

### BJH Adsorption Cumulative Pore Area (Larger)

Halsey : Faas Correction





COMPANY NAME

MicroActive 5.00.03

TriStar II 3020 Version 3.02  
Serial # 888 Unit 1 Port 2

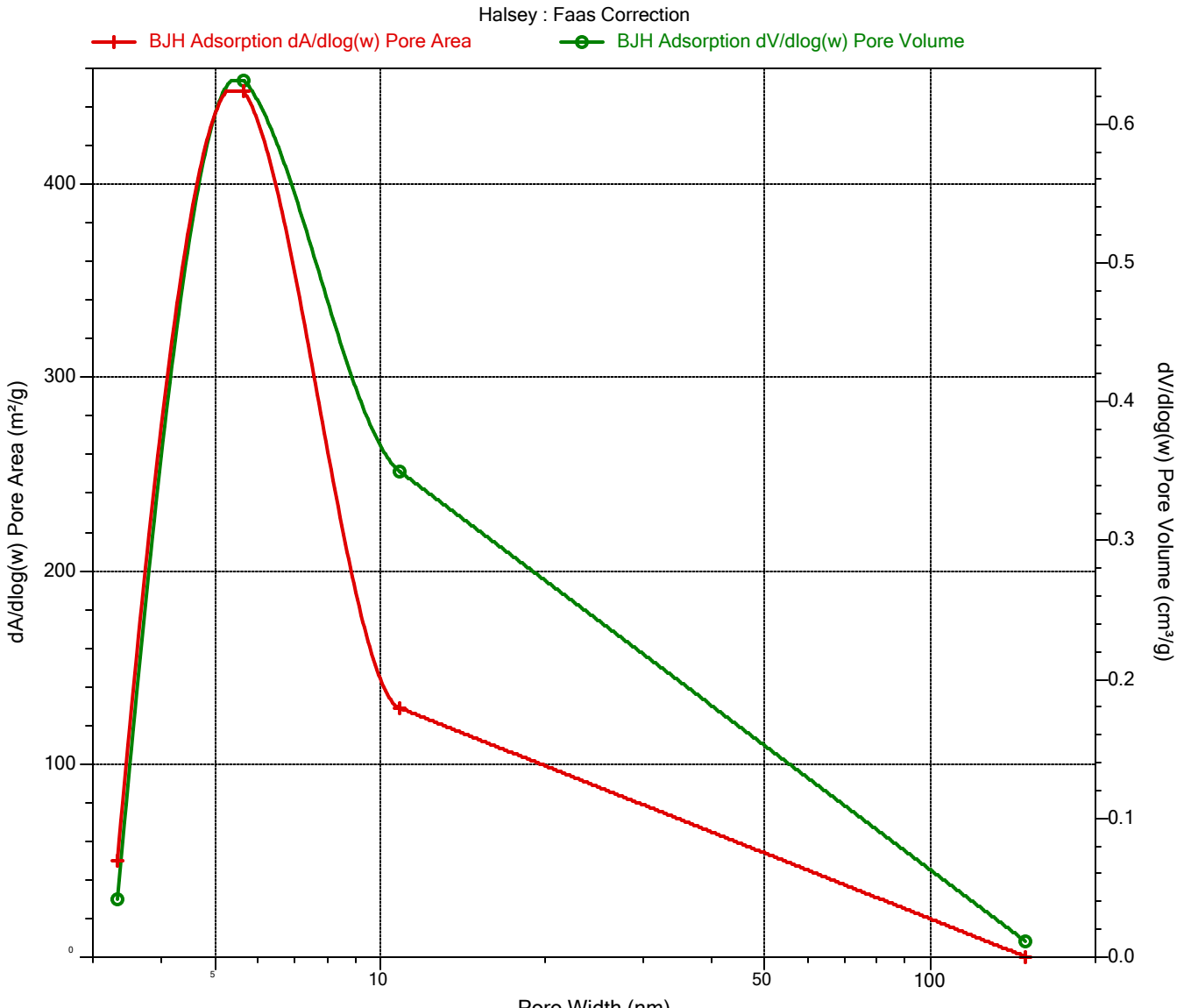
Page 9 of 13

File name: FILE NAME  
Chemist: Initials  
Submitter: Particle Technology Labs  
File: R:\Tristar II 3020...\Isotherm Report Example 2022.SMP

Started: 7/26/2022 3:03:18 PM	Analysis adsorptive: N2
Completed: 7/26/2022 6:28:51 PM	Analysis bath temp.: 77.350 K
Report time: 12/14/2022 4:32:03 PM	Thermal correction: No
Sample mass: 0.2183 g	Ambient free space: 13.7368 cm <sup>3</sup> Measured
Analysis free space: 41.9258 cm <sup>3</sup>	Equilibration interval: 10 s
Low pressure dose: None	Sample density: 1.000 g/cm <sup>3</sup>
Automatic degas: No	

Comments: Material Name - Sample ID - PTL Project # - Test Method # - PTL ID #

### BJH Adsorption dA/dlog(w) Pore Area





COMPANY NAME

MicroActive 5.00.03

TriStar II 3020 Version 3.02  
Serial # 888 Unit 1 Port 2

Page 10 of 13

File name: FILE NAME  
 Chemist: Initials  
 Submitter: Particle Technology Labs  
 File: R:\Tristar II 3020...\Isotherm Report Example 2022.SMP

Started:	7/26/2022 3:03:18 PM	Analysis adsorptive:	N2
Completed:	7/26/2022 6:28:51 PM	Analysis bath temp.:	77.350 K
Report time:	12/14/2022 4:32:03 PM	Thermal correction:	No
Sample mass:	0.2183 g	Ambient free space:	13.7368 cm <sup>3</sup> Measured
Analysis free space:	41.9258 cm <sup>3</sup>	Equilibration interval:	10 s
Low pressure dose:	None	Sample density:	1.000 g/cm <sup>3</sup>
Automatic degas:	No		

Comments: Material Name - Sample ID - PTL Project # - Test Method # - PTL ID #

BJH Desorption Pore Distribution Report

Faas Correction

Halsey

$$t = 3.54 [ -5 / \ln(p/p^0) ] ^ 0.333$$

Width range: 1.7000 to 300.0000 nm  
 Adsorbate property factor: 0.95300 nm  
 Density conversion factor: 0.0015468  
 Fraction of pores open at both ends: 0.00

Pore Width Range (nm)	Average Width (nm)	Incremental Pore Volume (cm <sup>3</sup> /g)	Cumulative Pore Volume (cm <sup>3</sup> /g)	Incremental Pore Area (m <sup>2</sup> /g)	Cumulative Pore Area (m <sup>2</sup> /g)
367.5 - 114.8	136.5	0.002523	0.002523	0.074	0.074
114.8 - 18.1	20.2	0.031726	0.034249	6.284	6.358
18.1 - 9.4	11.1	0.192495	0.226744	69.233	75.591
9.4 - 6.4	7.3	0.318676	0.545420	174.471	250.062
6.4 - 4.3	4.9	0.055113	0.600533	44.851	294.912
4.3 - 3.6	3.9	0.003177	0.603710	3.264	298.176
3.6 - 2.8	3.1	0.000231	0.603941	0.295	298.471

COMPANY NAME

MicroActive 5.00.03

TriStar II 3020 Version 3.02  
Serial # 888 Unit 1 Port 2

Page 11 of 13

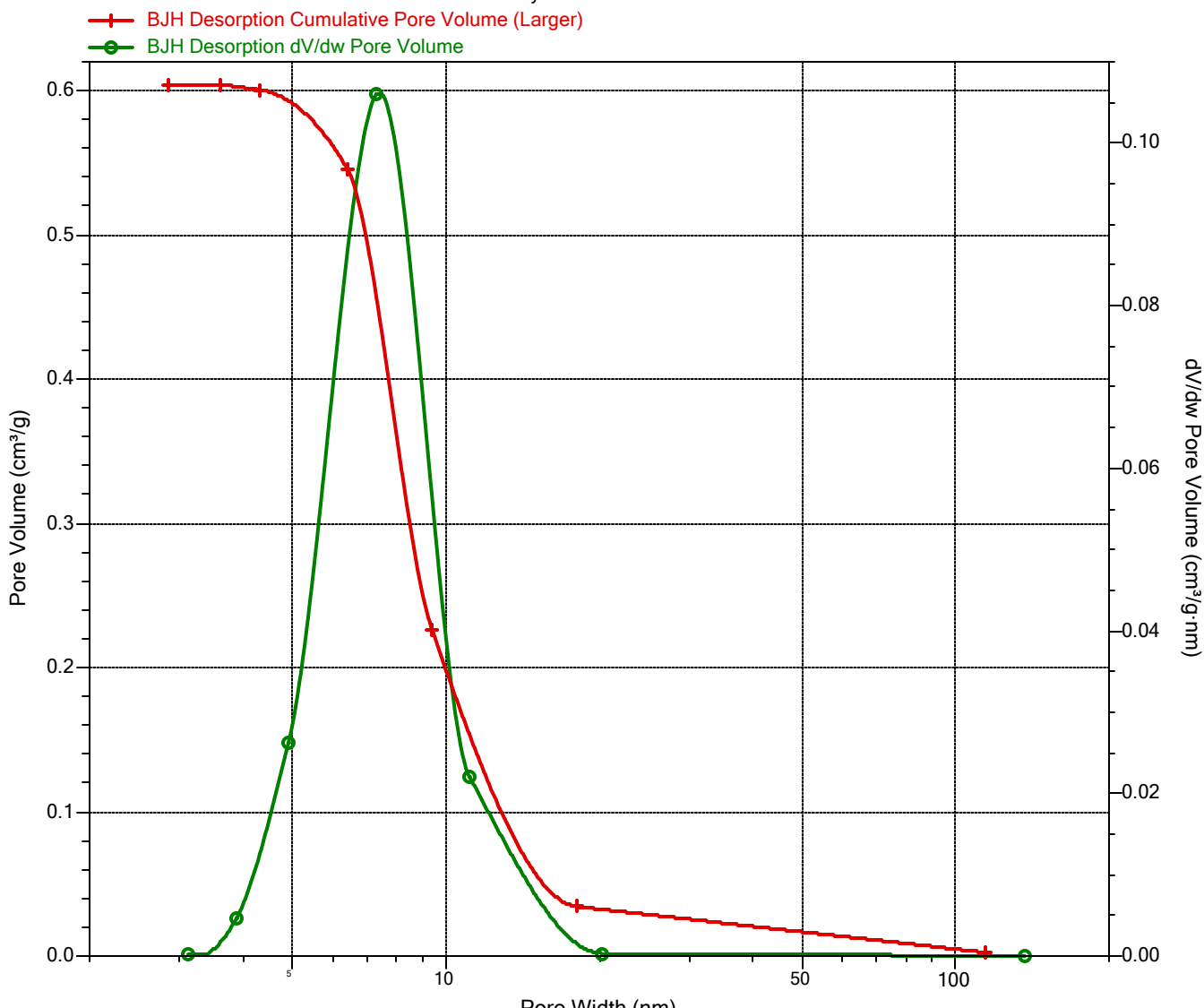
File name: FILE NAME  
Chemist: Initials  
Submitter: Particle Technology Labs  
File: R:\Tristar II 3020...\Isotherm Report Example 2022.SMP

Started: 7/26/2022 3:03:18 PM	Analysis adsorptive: N2
Completed: 7/26/2022 6:28:51 PM	Analysis bath temp.: 77.350 K
Report time: 12/14/2022 4:32:03 PM	Thermal correction: No
Sample mass: 0.2183 g	Ambient free space: 13.7368 cm <sup>3</sup> Measured
Analysis free space: 41.9258 cm <sup>3</sup>	Equilibration interval: 10 s
Low pressure dose: None	Sample density: 1.000 g/cm <sup>3</sup>
Automatic degas: No	

Comments: Material Name - Sample ID - PTL Project # - Test Method # - PTL ID #

### BJH Desorption Cumulative Pore Volume (Larger)

Halsey : Faas Correction



COMPANY NAME

MicroActive 5.00.03

TriStar II 3020 Version 3.02  
Serial # 888 Unit 1 Port 2

Page 12 of 13

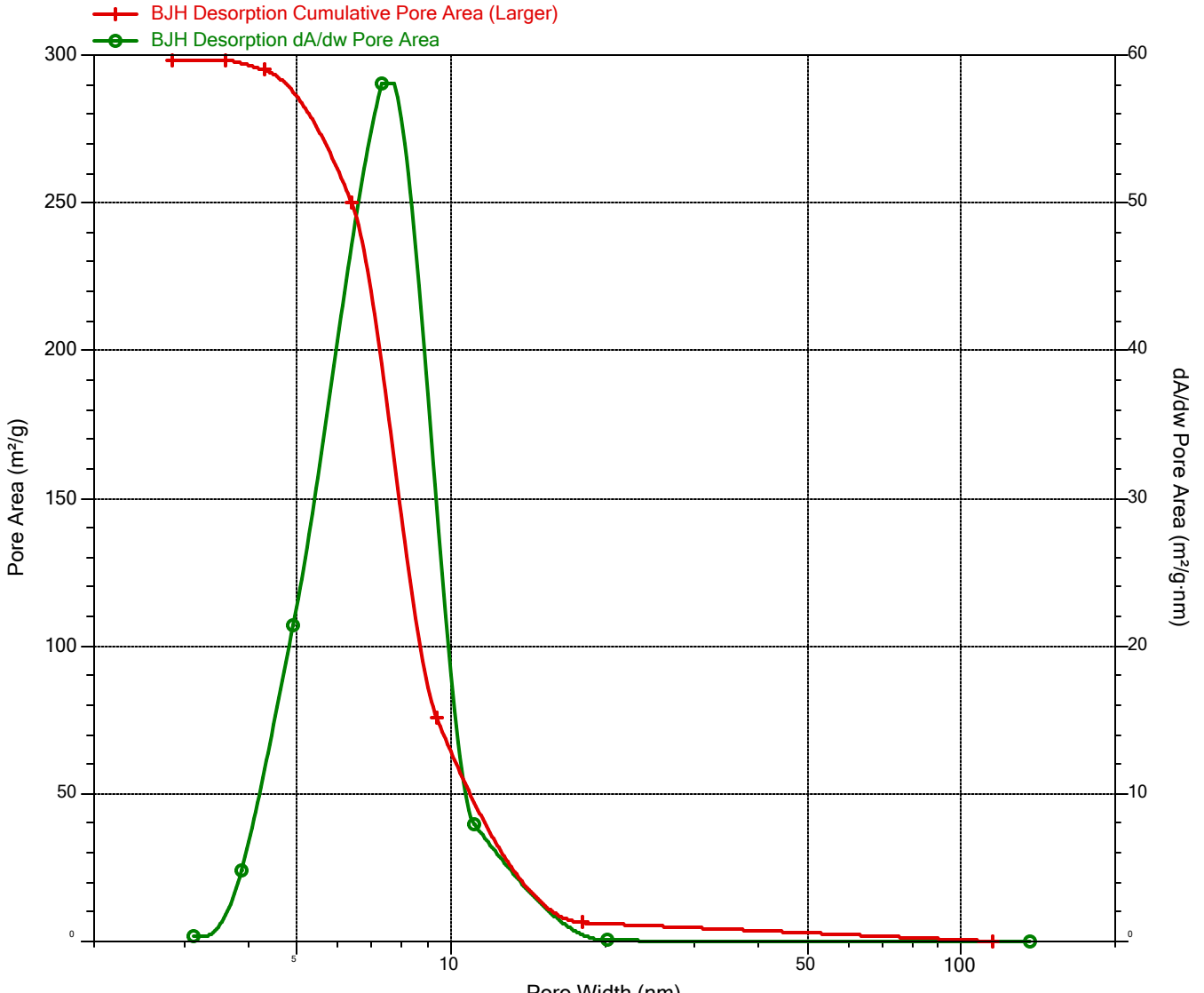
File name: FILE NAME  
Chemist: Initials  
Submitter: Particle Technology Labs  
File: R:\Tristar II 3020...\Isotherm Report Example 2022.SMP

Started:	7/26/2022 3:03:18 PM	Analysis adsorptive:	N2
Completed:	7/26/2022 6:28:51 PM	Analysis bath temp.:	77.350 K
Report time:	12/14/2022 4:32:03 PM	Thermal correction:	No
Sample mass:	0.2183 g	Ambient free space:	13.7368 cm <sup>3</sup> Measured
Analysis free space:	41.9258 cm <sup>3</sup>	Equilibration interval:	10 s
Low pressure dose:	None	Sample density:	1.000 g/cm <sup>3</sup>
Automatic degas:	No		

Comments: Material Name - Sample ID - PTL Project # - Test Method # - PTL ID #

### BJH Desorption Cumulative Pore Area (Larger)

Halsey : Faas Correction



COMPANY NAME

MicroActive 5.00.03

TriStar II 3020 Version 3.02  
Serial # 888 Unit 1 Port 2

Page 13 of 13

File name: FILE NAME  
Chemist: Initials  
Submitter: Particle Technology Labs  
File: R:\Tristar II 3020...\Isotherm Report Example 2022.SMP

Started: 7/26/2022 3:03:18 PM	Analysis adsorptive: N2
Completed: 7/26/2022 6:28:51 PM	Analysis bath temp.: 77.350 K
Report time: 12/14/2022 4:32:03 PM	Thermal correction: No
Sample mass: 0.2183 g	Ambient free space: 13.7368 cm <sup>3</sup> Measured
Analysis free space: 41.9258 cm <sup>3</sup>	Equilibration interval: 10 s
Low pressure dose: None	Sample density: 1.000 g/cm <sup>3</sup>
Automatic degas: No	

Comments: Material Name - Sample ID - PTL Project # - Test Method # - PTL ID #

### BJH Desorption dA/dlog(w) Pore Area

Halsey : Faas Correction

—+— BJH Desorption dA/dlog(w) Pore Area      —○— BJH Desorption dV/dlog(w) Pore Volume

