

Report date: 12/21/2022 **Operator:** JW
File Name: Lot A-501-61 Aliquot 1.qcuPhysIso

Analysis Data

Sample

ID SilAl1 **Weight** 0.2307g

Analysis

| | | | | | |
|----------------------|---|---------------------------|----------------------|------------------|------------------------|
| Data ID | {9ad2a9c9-e177-4d65-955d-634f5c6dfbb1} | Date | 08/31/2020 | Duration | 1939.65min |
| Operator | JW | Date | 08/31/2020 | Firmware | 1.06 |
| Instrument | St 1 on NOVA touch 4LX [s/n:1050014498] | Void Volume Mode | He Measure | Cold Zone | 2.89477cm ³ |
| Ambient Temp. | 26.75°C | Cell Type | 9 mm with filler rod | | |
| Warm Zone | 3.87079cm ³ | p₀ Mode | Continuous | | |
| Thermal Delay | 120sec | | | | |

Adsorbate

Name Nitrogen **Molecular Weight** 28.013g/mol **Cross Sectional Area** 16.2Å²/molecule
Non-Ideality 6.58e-05 1/Torr **Bath Temperature** 77.35K

Degas information

Type Flow Degassing
Operator JW
Heating Heat to 90.0 °C at 10.0 °C/min then hold for 60 min
Heat to 350.0 °C at 10.0 °C/min then hold for 240 min

Multipoint BET Summary/Results

| | | | | | |
|------------------------------|------------|-------------------|---------|---------------------|---------------------------|
| Isotherm Branch | Adsorption | Slope | 17.1244 | Intercept | 0.142445 |
| Correlation coeff., r | 0.999997 | C constant | 121.217 | Surface area | 201.688 m ² /g |

BJH Adsorption Summary/Results

| | | | | | |
|---------------------|--------------------------|--------------------|----------------------------|----------------------|------------|
| Surface Area | 211.02 m ² /g | Pore Volume | 0.60064 cm ³ /g | Pore Diameter | 9.09283 nm |
|---------------------|--------------------------|--------------------|----------------------------|----------------------|------------|

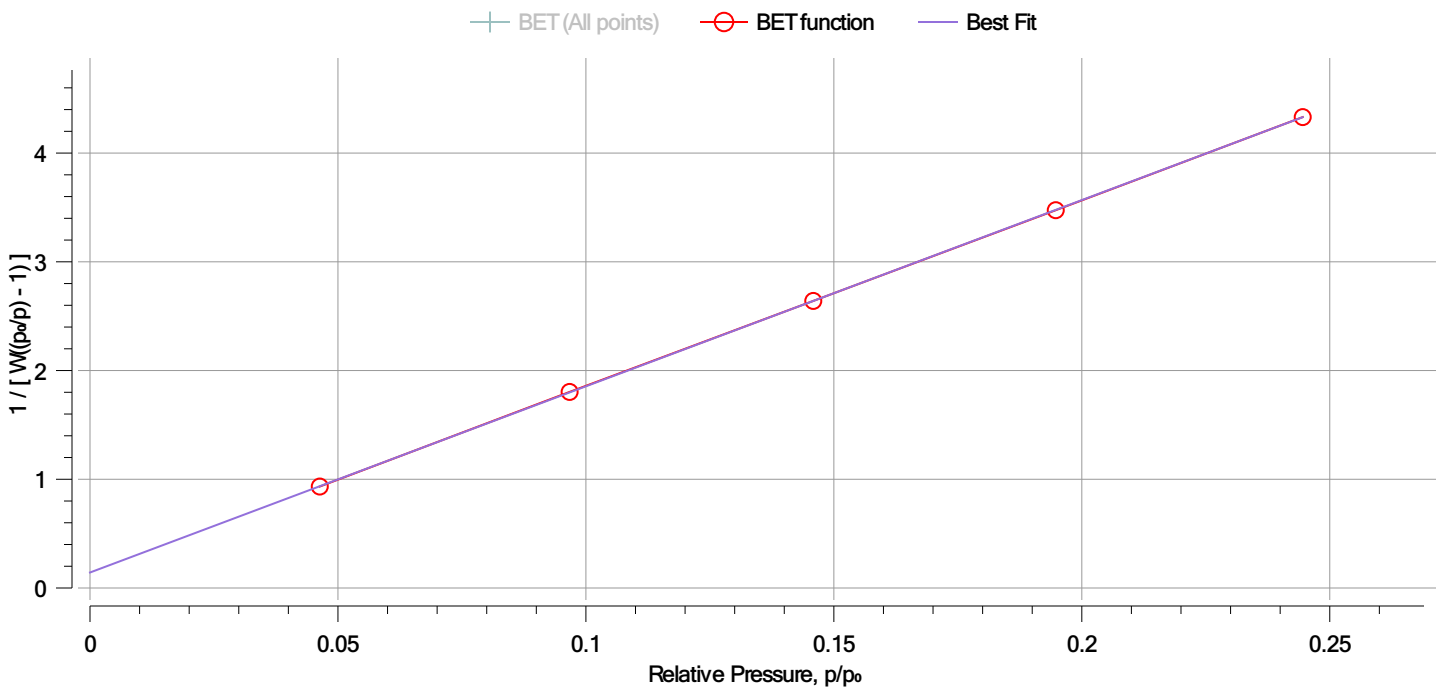
BJH Desorption Summary/Results

| | | | | | |
|---------------------|---------------------------|--------------------|-----------------------------|----------------------|------------|
| Surface Area | 293.208 m ² /g | Pore Volume | 0.643826 cm ³ /g | Pore Diameter | 7.71097 nm |
|---------------------|---------------------------|--------------------|-----------------------------|----------------------|------------|

BET-Multipoint BET

| Relative Pressure, p/p ₀ | Volume Adsorbed @STP cm ³ /g | 1 / [W((p ₀ /p) - 1)] |
|-------------------------------------|---|------------------------------------|
| 0.0463342 | 41.6615 | 0.9331 |
| 0.0967156 | 47.5083 | 1.8032 |
| 0.145850 | 51.7478 | 2.6402 |
| 0.194746 | 55.6899 | 3.4746 |
| 0.244548 | 59.8027 | 4.3310 |

BET-Multipoint BET



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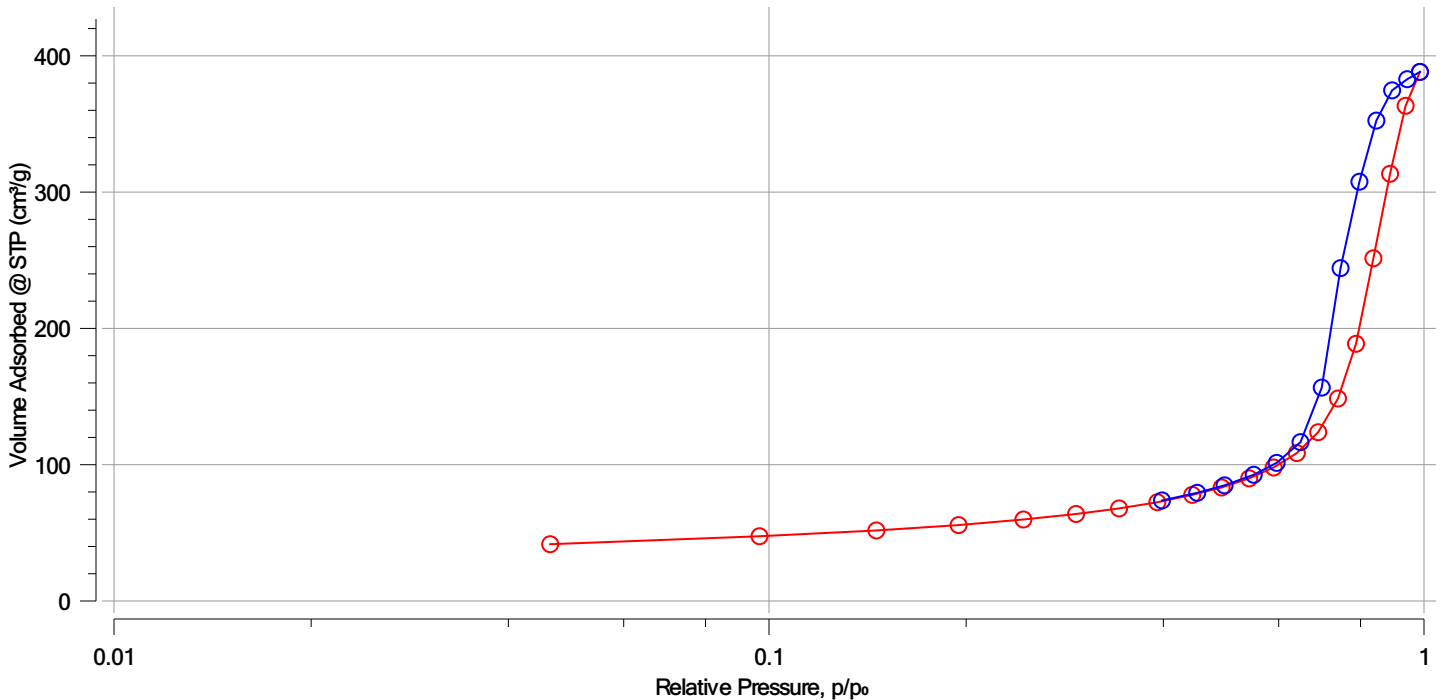
Operator: JW

Isotherm-Raw Analysis Data

| Pressure Torr | p ₀ Torr | Relative Pressure, p/p ₀ | Volume Adsorbed @STP cm ³ | Time min | Tolerance | Equ sec | TimeOut sec |
|------------------|------------------------|--|--|-------------|-----------|------------|----------------|
| 35.0856 | 757.228 | 0.0463342 | 9.61131 | 59.6833 | 0.10 | 0 | 240 |
| 73.3481 | 758.390 | 0.0967156 | 10.9602 | 81.8333 | 0.10 | 0 | 240 |
| 110.054 | 754.568 | 0.145850 | 11.9382 | 100.117 | 0.10 | 0 | 240 |
| 146.988 | 754.767 | 0.194746 | 12.8477 | 120.167 | 0.10 | 0 | 240 |
| 184.534 | 754.591 | 0.244548 | 13.7965 | 148.167 | 0.10 | 0 | 240 |
| 221.514 | 752.685 | 0.294298 | 14.7272 | 176.250 | 0.10 | 0 | 240 |
| 257.559 | 752.288 | 0.342368 | 15.6683 | 200.083 | 0.10 | 0 | 240 |
| 294.630 | 752.302 | 0.391638 | 16.7154 | 230.133 | 0.10 | 0 | 240 |
| 332.813 | 751.710 | 0.442741 | 17.9669 | 265.983 | 0.10 | 0 | 240 |
| 367.974 | 749.452 | 0.490991 | 19.2096 | 291.400 | 0.10 | 0 | 240 |
| 405.409 | 749.524 | 0.540889 | 20.7529 | 327.833 | 0.10 | 0 | 240 |
| 441.704 | 749.395 | 0.589414 | 22.5963 | 374.017 | 0.10 | 0 | 240 |
| 479.399 | 749.586 | 0.639551 | 25.0358 | 424.950 | 0.10 | 0 | 240 |
| 517.011 | 749.983 | 0.689364 | 28.5659 | 503.500 | 0.10 | 0 | 240 |
| 553.908 | 749.491 | 0.739045 | 34.2725 | 606.300 | 0.10 | 0 | 240 |
| 589.917 | 749.193 | 0.787403 | 43.5343 | 682.000 | 0.10 | 0 | 240 |
| 626.886 | 748.936 | 0.837036 | 58.0114 | 805.217 | 0.10 | 0 | 240 |
| 664.893 | 749.143 | 0.887538 | 72.3130 | 924.017 | 0.10 | 0 | 240 |
| 702.134 | 749.046 | 0.937372 | 83.8210 | 1042.45 | 0.10 | 0 | 240 |
| 737.851 | 748.410 | 0.985890 | 89.5575 | 1132.00 | 0.10 | 0 | 240 |
| 705.611 | 748.503 | 0.942697 | 88.3215 | 1160.43 | 0.10 | 0 | 240 |
| 669.286 | 748.634 | 0.894010 | 86.4373 | 1199.67 | 0.10 | 0 | 240 |
| 632.429 | 747.731 | 0.845797 | 81.3165 | 1294.03 | 0.10 | 0 | 240 |
| 594.636 | 746.166 | 0.796921 | 70.9655 | 1395.73 | 0.10 | 0 | 240 |
| 556.309 | 745.959 | 0.745764 | 56.3399 | 1499.97 | 0.10 | 0 | 240 |
| 519.435 | 744.105 | 0.698067 | 36.1215 | 1651.97 | 0.10 | 0 | 240 |
| 482.342 | 744.525 | 0.647851 | 26.8949 | 1736.72 | 0.10 | 0 | 240 |
| 443.158 | 743.910 | 0.595715 | 23.3792 | 1805.55 | 0.10 | 0 | 240 |
| 408.413 | 743.113 | 0.549597 | 21.3690 | 1835.82 | 0.10 | 0 | 240 |
| 368.596 | 743.049 | 0.496059 | 19.5764 | 1880.02 | 0.10 | 0 | 240 |
| 334.679 | 742.763 | 0.450587 | 18.3110 | 1912.57 | 0.10 | 0 | 240 |
| 295.637 | 742.530 | 0.398147 | 17.0224 | 1939.65 | 0.10 | 0 | 240 |

Isotherm-Logarithmic

○ Adsorption ○ Desorption



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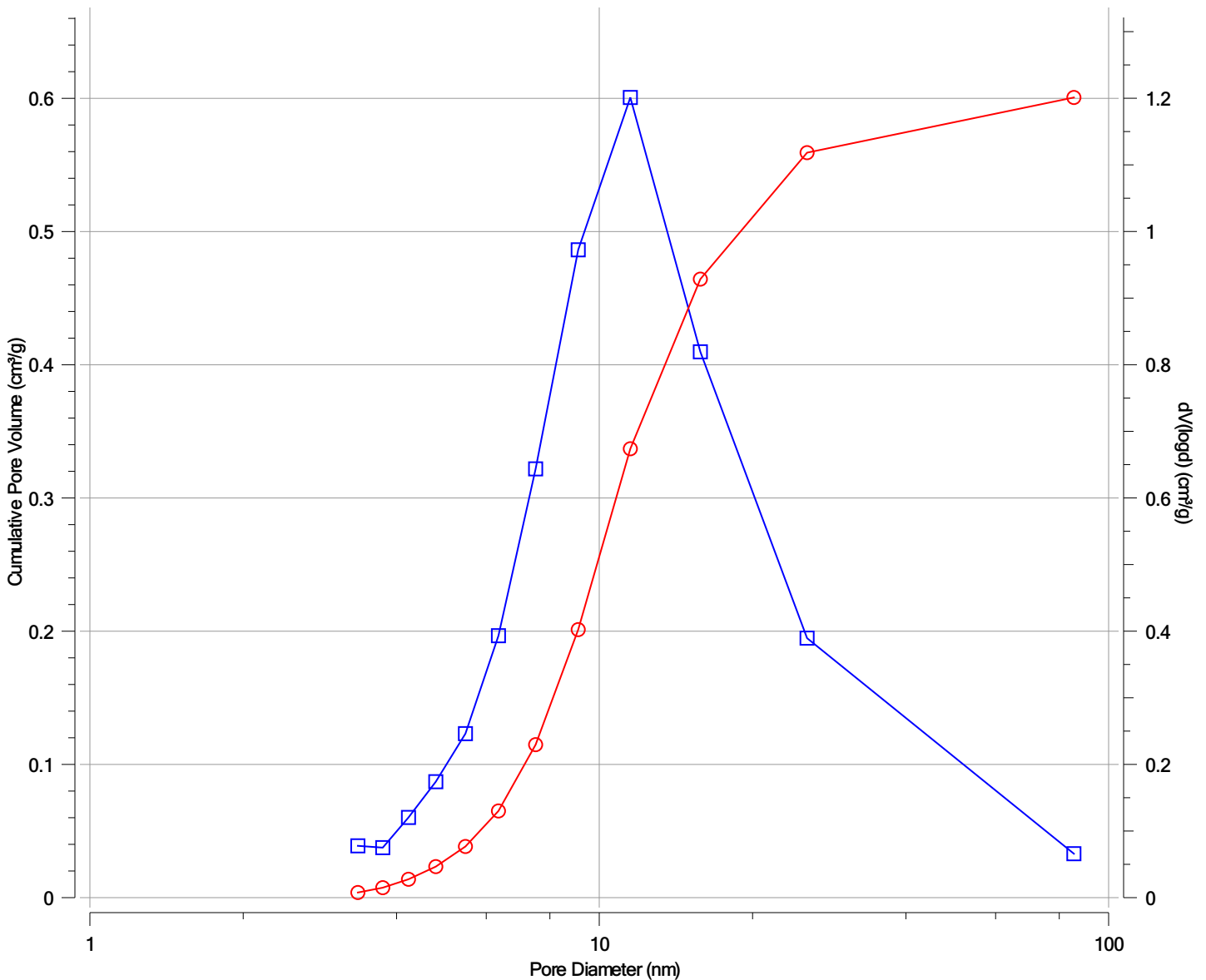
JW

BJH Pore Size Distribution-Adsorption

| Diameter | Pore Volume | Pore Surface Area | dV(d) | dS(d) | dV(log d) | dS(log d) |
|----------|--------------------|-------------------|-----------------------|----------------------|--------------------|-------------------|
| nm | cm ³ /g | m ² /g | cm ³ /nm/g | m ² /nm/g | cm ³ /g | m ² /g |
| 3.35819 | 3.846327e-03 | 4.581423e+00 | 1.006736e-02 | 1.199140e+01 | 7.776214e-02 | 9.262375e+01 |
| 3.75808 | 7.472976e-03 | 8.441533e+00 | 8.682201e-03 | 9.241105e+00 | 7.505225e-02 | 7.988363e+01 |
| 4.22188 | 1.379507e-02 | 1.443137e+01 | 1.239880e-02 | 1.174717e+01 | 1.203851e-01 | 1.140582e+02 |
| 4.77648 | 2.329070e-02 | 2.238336e+01 | 1.584480e-02 | 1.326903e+01 | 1.740361e-01 | 1.457444e+02 |
| 5.46118 | 3.839279e-02 | 3.344477e+01 | 1.961003e-02 | 1.436321e+01 | 2.461836e-01 | 1.803153e+02 |
| 6.34044 | 6.506740e-02 | 5.027301e+01 | 2.698765e-02 | 1.702573e+01 | 3.932045e-01 | 2.480613e+02 |
| 7.50047 | 1.148272e-01 | 7.680990e+01 | 3.736666e-02 | 1.992763e+01 | 6.436413e-01 | 3.432537e+02 |
| 9.09283 | 2.011980e-01 | 1.148050e+02 | 4.661012e-02 | 2.050412e+01 | 9.724898e-01 | 4.278052e+02 |
| 11.5083 | 3.369455e-01 | 1.619873e+02 | 4.558387e-02 | 1.584377e+01 | 1.201153e+00 | 4.174897e+02 |
| 15.7933 | 4.642886e-01 | 1.942397e+02 | 2.277233e-02 | 5.767581e+00 | 8.194015e-01 | 2.075310e+02 |
| 25.5859 | 5.592245e-01 | 2.090816e+02 | 6.784435e-03 | 1.060651e+00 | 3.895271e-01 | 6.089707e+01 |
| 85.4734 | 6.006405e-01 | 2.110198e+02 | 3.915231e-04 | 1.832257e-02 | 6.594491e-02 | 3.086103e+00 |

BJH-Adsorption-dV(logd)

□ dV(log d) ○ Cumulative Pore Volume



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BJH Pore Size Distribution-Desorption

| Diameter | Pore Volume | Pore Surface Area | dV(d) | dS(d) | dV(log d) | dS(log d) |
|----------|--------------------|-------------------|-----------------------|----------------------|--------------------|-------------------|
| nm | cm ³ /g | m ² /g | cm ³ /nm/g | m ² /nm/g | cm ³ /g | m ² /g |
| 3.41295 | 0.000000e+00 | 0.000000e+00 | 0.000000e+00 | 0.000000e+00 | 0.000000e+00 | 0.000000e+00 |
| 3.81384 | 0.000000e+00 | 0.000000e+00 | 0.000000e+00 | 0.000000e+00 | 0.000000e+00 | 0.000000e+00 |
| 4.29531 | 1.216796e-03 | 1.133140e+00 | 2.168297e-03 | 2.019224e+00 | 2.141459e-02 | 1.994232e+01 |
| 4.86962 | 6.664321e-03 | 5.607840e+00 | 9.273099e-03 | 7.617099e+00 | 1.038504e-01 | 8.530472e+01 |
| 5.57816 | 2.637758e-02 | 1.974388e+01 | 2.376203e-02 | 1.703935e+01 | 3.046403e-01 | 2.184524e+02 |
| 6.51558 | 1.143888e-01 | 7.377509e+01 | 8.420182e-02 | 5.169258e+01 | 1.260539e+00 | 7.738613e+02 |
| 7.71097 | 3.282408e-01 | 1.847090e+02 | 1.589341e-01 | 8.244566e+01 | 2.814726e+00 | 1.460115e+03 |
| 9.43302 | 4.749436e-01 | 2.469172e+02 | 6.990657e-02 | 2.964335e+01 | 1.512111e+00 | 6.411989e+02 |
| 12.0976 | 5.738487e-01 | 2.796195e+02 | 3.061440e-02 | 1.012244e+01 | 8.476972e-01 | 2.802853e+02 |
| 16.6952 | 6.195715e-01 | 2.905742e+02 | 7.665812e-03 | 1.836648e+00 | 2.915290e-01 | 6.984728e+01 |
| 27.5804 | 6.348999e-01 | 2.927973e+02 | 9.697962e-04 | 1.406502e-01 | 5.986386e-02 | 8.682098e+00 |
| 86.9238 | 6.438256e-01 | 2.932080e+02 | 8.675742e-05 | 3.992346e-03 | 1.510268e-02 | 6.949851e-01 |

BJH-Desorption-dV(logd)

