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A comparative study of two rock crushing methods using quartz monzodiorite from Laxemar, Oskarshamn

Effects on oxygen consumption, sorption capacity, morphology and pore size distribution

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Abstract

In this study, rock material from Laxemar, Oskarshamn, Sweden have been crushed into smaller fractions using traditional crushing with hammer and swing mill with agate mortar and by an alternative method developed by selFrag AB in Switzerland where the rock is subjected to high voltage pulse power fragmentation. Grains produced from these two crushing methods were compared with regards to:

- alteration and fragmentation of the crushed samples using an optical microscope and a Scanning Electron Microscope (SEM),
- pore size distribution calculated from N₂ adsorption analysis,
- oxygen consumption by monitoring the O₂ (g) over sterilized samples of crushed rock in deionised water using gas chromatography,
- sorption capacity of Sr²⁺ in a synthetic groundwater by determining the distribution coefficient (R_d) and the adsorption and desorption isotherms, of which the latter two suffered from experimental problems and higher uncertainties than the former methods, which data thus can be classified as being of higher quality.

The ambition of the study was to investigate which of the crushing methods that is most able to produce material representative for intact bedrock. Unfortunately, the material used for the different crushing methods differed slightly in mineralogical and chemical composition, although being sampled at close distance (m scale) and from the same rock type.

None of the crushing methods have created grains that show similar pore size distributions over the entire spectra of grain sizes. This indicates, together with SEM-observations of micro-fracture formation, that both crushing methods have led to alteration of the rock material making none of them representative for intact bedrock and implies that none of the crushing methods have produced completely unaffected grains. Even if the pore size distribution curves demonstrate that there is some variability in pore occurrence between the high-voltage crushed grain size fractions, the observed slightly greater oxygen consumption, the more angular feldspar surfaces and the higher amount of micro-fractures indicate that mechanical crushing has created larger area of reactive surfaces or higher reactivity of the surfaces. The SEM investigations showed that the high voltage crushing has affected grains less than the mechanical crushing, and also produced grains that are more similar between different size fractions. Therefore, although the general conclusion is that high voltage crushing method creates a material that is most representative for intact bedrock, although there are large uncertainties related to some of the experimental methods and to the slight difference in starting material composition.

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1 Introduction

1.1 Background

The properties of the bedrock that constitutes the third barrier in the proposed storage method KBS-3 are important aspects regarding the final repository of spent nuclear fuel (HLW) in Sweden. The first barrier is a copper canister with a thickness of 5 cm and a cast iron inset and the second is a layer of bentonite clay used to protect the canister against minor movements in the bedrock, to limit the inflow of the low concentrations of corrosive agents in the groundwater and to minimize radionuclide mobilization in case of canister failure (Rosborg and Werme 2008).

1.1.1 Reducing and sorption capacity

The copper canisters holding the HLW may corrode if in contact with oxygen (O₂)-containing water. This water could be introduced via highly transmissive fractures during a future glacial period when melt water may contain a relatively high amount of dissolved oxygen, low concentration of organic matter and the groundwater flow might be enhanced (Spiessl et al. 2007, Drake et al. 2009). During the initial period after backfilling, the HLW repository will also be subjected to a period of increased dissolved oxygen, compared to the undisturbed reducing conditions of the groundwaters at the actual depth (Yang et al. 2007).

In case of canister failure, dissolved oxygen present in the groundwater may increase the mobility of several long-lived radionuclides (Rivas-Perez et al. 2003, Toulhoat 2002). Organic material is present at repository depth in concentrations enough to allow for complete oxygen reduction by microbial activity (Pedersen 2000) but it is still important to investigate the abiotic contribution to the reducing capacity in the form of reduced minerals present on fracture walls (*e.g.* chlorite) and in the rock matrix (*e.g.* biotite and pyrite) (Drake et al. 2008, Sidborn and Neretnieks 2008, Sidborn et al. 2010). Furthermore, it is important to study the sorption capacity of the bedrock to investigate its capacity to retard potential mobilized radionuclides (Toulhoat 2002).

1.1.2 Representative rock material

Because diffusion and reaction rates are slow in intact bedrock, smaller fractions of rock are generally used in laboratory experiments. Traditionally, larger pieces of bedrock are crushed mechanically using a swing mill with agate mortar or a hammer to acquire smaller fractions. However, this crushing method could create surfaces with higher reactivity because fragmentation may occur across mineral grains instead of along natural grain boundaries where the binding energy is weaker (Friedman et al. 1972). Furthermore, mechanical crushing is hypothesized to alter the surfaces of the grains through an increase in micro-cracks leading to an overestimation of the surface area, in particular for smaller fractions (André 2009). Therefore, concern has been raised regarding how representative mechanically crushed grains are for intact bedrock. selFrag AG in Switzerland has developed a new crushing method where rock samples are submerged in water and fragmented using high voltage (HV) pulsed power technology. This allows the grains to be separated along natural grain boundaries (www.selfrag.se). The hypothesis is that the HV method will create grains that are more representative for the actual bedrock, compared with the mechanical crushing method.

1.2 Aim of the study

The aim of this study was to investigate potential differences in rock material crushed by two different methods, *i.e.* mechanically crushed (M) material and rock fragmented using high voltage current (HV). The parameters studied were:

- 1) oxygen consumption,
- 2) sorption capacity and weathering tendency,
- 3) fracturing and possible alteration of grains,
- 4) pore size distribution.

These provide material-specific information that can be of use in the context of a repository for spent nuclear fuel, e.g. with regard to abiotic oxygen consumption after the operation phase (1), retardation of radionuclides by sorption (2) and matrix diffusion (implications from 4). The third parameter is mainly used to test the suitability of different crushed materials to be used in experiments to interpret the other parameters.

1.3 Limitations

The starting conditions for this study were not optimal because the original rock material (samples from the borehole KLX09C, Laxemar, Oskarshamn) used for preparation according to the two different crushing methods differed somewhat in both foliation and composition. Compensations for this were made when possible during the interpretation of the results but it would have been more favourable if the rock had been more homogeneous resulting in the same rock composition for both samples and their respective size fractions. The reason for the difference in rock composition is the heterogeneity of the rock type. Both samples are Ävrö granite, from the same borehole and sampled only two meters apart and it was therefore assumed that their composition would be very similar. Unfortunately, this was not the case, which partly may be attributed to relatively small sample volumes, due to the narrow drill core diameter and fractures that had to be avoided. A further explanation is that the rock is porphyritic, with large feldspar phenocrysts. The latter are heterogeneously distributed and have large effect on the composition if sample volumes are small.

2 Materials and experimental methods

2.1 Rock material

Two samples were taken at the beginning of 2010 from the borehole KLX09C in Laxemar, Oskarshamn. The borehole was drilled in January 2006 and the cores subsequently stored in drill core wooden boxes. The sample that was sent to Switzerland for high voltage crushing originated from 38 m while the mechanically crushed sample was taken from 40 m depth. Intact samples of the drill core from the depths of interest were also investigated.

2.2 Crushing methods

Throughout this report the abbreviations “M” and “HV” are used to denote samples crushed mechanically and through high-voltage pulse power fragmentation, respectively.

The mechanical crushing was performed by Isochron Geoconsulting, Sweden, using hammer (sample was wrapped in paper to avoid metallic iron from the hammer in the crushed material) and swing mill with agate mortar inset. Hammer was used as a first step in order to make drill core pieces small enough to fit into the agate mortar.

The high-voltage pulse power fragmentation was conducted at selFrag AG, Kerzers, Switzerland. Worth noting is that due to limited size of the sample preparation vessel at selFrag the sample was subjected to some mechanical treatment prior to the high voltage fragmentation. The process water in which the sample was submerged was degassed with N₂ gas purging to avoid oxidation, and a PTFE vessel and a special Cu-electrode were used to avoid iron contamination. The sample was treated with a pulse voltage of 110–140 kV and a frequency of 2 Hz. After treatment, the sample was sedimented and decanted, freeze dried, PUR-sieved and shipped in vacuum-sealed bags to the University of Stockholm.

Both samples (mechanically crushed and high-voltage fragmentation) were sieved by Isochron Geoconsulting, Sweden, to acquire five different size fractions; <0.25 mm, 0.25–0.5 mm, 0.5–1.0 mm, 1.0–2.0 mm and 2.0–3.0 mm. The mechanical milling and all sieving was performed during the period May–June 2010 in aerobic environment and the samples thereafter were kept in plastic jars with lids.

Samples resulting from both crushing methods were washed in ethanol-water mixtures before the redox and sorption experiments, as described below in Sections 2.6 and 2.7, in order to remove small particles and to achieve sterile conditions.

2.3 Chemical/mineral composition, element distribution and rock classification

The rock samples were sent to ALS Scandinavia AB for total extraction and quantification using ICP-QMS and ICP-AES. Materials analysed for both HV and M sample were: pieces of the intact drill cores (crushed and ground without sieving) and the 0.5–1.0 mm size fractions.

Rock classification was performed according to the IUGS (International Union of Geological Sciences) classification system. The classification was performed at Stockholm University through identification of minerals in 30 µm thin sections prepared from the drill cores (using a polarizing petrographic microscope in plane-polarized and cross-polarized light). For the analysis 1,000 points of the thin sections were identified in order to determine the mineral content of the bedrock with high certainty.

Thin sections were also prepared from the 0.5–1.0 mm and 2.0–3.0 mm size fractions.

2.4 Pore size distribution and surface area

Data from measurements of N₂ adsorption (Micromeritics ASAP 2020, Surface area and porosity analyser) were used to calculate the pore size distribution using the density functional theory (DFT). The samples are dried for 6 hours at 350°C with a vacuum set point of 10 µmHg. The equilibrium criterion for the isotherm measurements was <0.01% under 10 sec.

The DFT method allows the pore size distribution (PSD) to be determined over a relatively large range of pore diameters compared to older models. The PSD was calculated for all samples using the DFT Plus v3.00 (ASAP 2020 v1.05) software from Micromeritics for slit-shaped pores. DFT is a quantum mechanical modelling method used in physics and chemistry to investigate the electronic structure of many-body systems (cf. Ravikovitch et al. 1998). Samples from the 0.5–1.0 mm size fractions (about 11 to 15 g) were analysed in duplicates to verify/validate the results of the BET (Brunauer, Emmett, and Teller) surface area and pore size measurements. The total uncertainty in the surface area analysis is estimated to be less than 10%.

Before the experiments all samples were washed in ethanol and decanted to remove dust particles and then dried in an oven at 110°C. The measurements were performed in August and November 2010.

2.5 Sample fracturing and alteration

To verify any potential differences in fracturing and possible alteration of the samples during the two different crushing procedures, both in grain boundaries and within grains, thin sections of the drill cores and the 0.5–1.0 mm and 2.0–3.0 mm size fractions (mounted in epoxy on a glass slide and polished) were investigated using a scanning electron microscope (SEM JEOL JSM-7000F).

2.6 Redox Reactivity

The reactivity towards dissolved O₂ was tested through batch experiments. Flasks of ca 115 mL containing ca 30 g crushed rock of the 1.0–2.0 mm size fraction and 65 mL water as well as control samples with no rock material and ca 75 mL water were prepared by Microbial Analytics Sweden AB and sealed with a rubber septum (Table 2-1). All the materials and solutions (except the mineral samples) were autoclave-sterilized to prevent any microbial contribution to oxygen consumption and, hence, focus the study on the intrinsic reducing capacity of the minerals present. The mineral samples were previously sterilised by washing with a 70% ethanol aqueous solution and then rinsing with sterilised distilled water. At the beginning of the experiment each flask was injected with ca 2.6 mL air ($\approx 1.08 \cdot 10^{-4}$ mol O₂) and the O₂ concentration in the gas phase was then monitored regularly using gas chromatography (parameters listed in Table 2-2 below). Duplicate flasks of both HV and M as well as control samples without rock material were prepared. The control samples should not show any change in O₂ due to consumption and therefore these changes in oxygen are considered to represent the variations that might occur due to possible leakage of oxygen into the flasks (+), potential oxygen consumption by microbes (–) and the error range of the gas chromatograph (\pm). The estimated uncertainty of the method was $\pm 5\%$. The amount of O₂ added is well below the expected Fe(II) content of the rock samples, which should be ≈ 0.01 mol (from an Fe₂O₃ content of $\approx 6\%$, assuming that half of the iron is Fe(II), see Drake and Tullborg (2006, Section 7.5).

Table 2-1. Starting conditions for the O₂ consumption samples before and after air injection.

Sample	Rock material (g)	H ₂ O (mL)	O ₂ (ppm) before injection	O ₂ (ppm) (+1 day)
Control 1	–	75	<1,000	12,963.1
Control 2	–	74	<1,000	14,989.3
HV1	30.06	64	<1,000	14,723.6
HV2	30.03	63	<1,000	12,971.7
M1	30.07	64	<1,000	16,511.8
M2	30.04	64	<1,000	15,428.6

Table 2-2. Parameters used for the determination of oxygen concentration in the gas phase using the gas-chromatograph.

Parameter	Setup
Column	CP-PoraBOND Q 25 m × 0.32 mm and CP-Molsieve 5A 50 m × 0.53 mm (parallel)
Detector	Thermal Conductive Detector (TCD)
Carrier gas	Helium (flow: 20 mL/min)
Temperature	50°C
Injection	Split1-2

Because both the gas phase volume and the injected volume of air differed slightly between flasks there was some difference in starting concentration of O₂ between the samples (Table 2-1).

The syringe used for gas extraction from the flasks and subsequent injection into the GC was flushed with helium gas prior to each extraction of 200 µL to avoid O₂ contamination of the samples. The sterile environment in the flasks was maintained by washing all equipment in ethanol before use.

The argon gas contained in the air injected into each flask was used as a calibration of the exact volume of air initially added (ca 200 µL). Therefore, all measured oxygen peak areas were normalized against the simultaneously measured peak area of the inert Ar(g) (see Appendix A1.1).

Two measurements per flask were carried out at each sampling event. The GC parameters are listed in Table 2-2. Quantification was carried out with an external calibration curve (see Appendix, Table A1-1) and measurements were performed once per month during four months. The oxygen levels were monitored over a total time period of 217 days.

The reproducibility of the measurements of changes in the O₂ contents in the gas phase of these batch experiments was found to be ±5%.

2.7 Sorption capacity and weathering tendency

Studies of the sorption capacity were carried out using a modified method from Cui and Eriksen (1995). In the present study the radioanalytical method using ⁸⁵Sr could not be used, and Sr concentrations were analysed by ICP-OES (see 2.7.3) at Stockholm University. The sorption experiments were performed between 16 Nov. and 21 Dec. 2010 and were followed immediately by the desorption study that lasted until the end of Jan. 2011. For determination of both the *distribution coefficient* (R_d) and the adsorption/desorption *isotherms* two sets of samples were prepared in PE bottles and tubes using a synthetic groundwater (SGW) with the composition given in Table 2-3. The size fraction used was 0.5–1.0 mm. All samples were washed in ethanol before the experiment start to remove dust particles. To focus the study on the properties of the surfaces rather than the quantity of surface area, the sample weights used were determined so that the same BET surface area to SGW ratio was achieved, see Table 2-4. However, it should be noted that similar BET surface area may not *per se* give totally comparable results because BET may not correspond equally to the amount of reactive surfaces in the different samples.

Table 2-3. Composition of the synthetic groundwater (SGW). All chemicals used were of proanalytical grade.

Specie	Conc. (mM)
Na ⁺	2.4
HCO ₃ ⁻	2.0
SiO ₃ ²⁻	0.2

Table 2-4. Experimental set-up and BET surface areas for the rock material.

Sample	Rock material (g)	BET (m ² /g)	SGW (mL)	m ² /mL SGW
HV R _d	18.19	0.2159	60.00	0.06550
HV isotherm	1.365	0.2159	4.500	0.06550
M R _d	20.00	0.1964	60.00	0.06550
M isotherm	1.500	0.1964	4.500	0.06550

SrCl₂ was added to the SGW to obtain solutions with the following Sr concentrations: 10⁻⁵ mol L⁻¹ for the determination of the distribution coefficients (presented in Section 3.6.1), and 10⁻², 10⁻³, 10⁻⁴, 10⁻⁵, 10⁻⁶ mol L⁻¹ for the isotherm determinations (presented in Section 3.6.2). Strontium from the slow leaching (dissolution) of the mineral samples affected the analysis, and attempts were made to correct for this effect by measuring blank samples, described in the next section. After the addition of strontium, the pH of the distribution coefficient solutions was adjusted by addition of suprapure HCl or NaOH to 8.2 to reflect natural pH-conditions, while for the sorption isotherm solutions the pH was adjusted to approximately 6 in order to avoid removal of Sr from the solution through formation of SrCO₃, which precipitates between pH 6.1 and 8 for the different Sr concentrations used.

To describe the uptake of cations the distribution ratio, R_d, is commonly defined as the ratio between the amount of cations sorbed either per weight or surface area of the solid (q) and the remaining cations in the aqueous phase (C). When the sorption system reaches an equilibrium state the distribution ratio becomes the equilibrium distribution coefficient, K_d. Because the samples were weighted so as to acquire the same surface area rather than comparing the same mass, the adsorption density, q, is defined as the amount of cations sorbed per unit surface area of solid:

$$R_d = q/C = (V/SA) \cdot (C_0 - C_t)/C_t$$

where V = volume of solution (cm³); SA = surface area of solid phase (m²); C₀ = initial [Sr²⁺]; C_t = [Sr²⁺] at time t. This equation was used for the adsorption and desorption experiments described below. The precision of the calculated distribution coefficients, based on the precision in the analyses of the aqueous solutions, was ±50 cm³/m².

2.7.1 Adsorption

All samples were prepared in duplicate sets. Blank samples were prepared both in Sr-free SGW to monitor Sr in the aqueous phase due to leaching from the rock material and without rock in Sr-containing SGW to see if any Sr adsorbed to the container walls.

To even out concentration gradients (homogenise) all samples were placed on a shaking table after addition of the solutions. The samples were mixed continuously the first 2 hours and thereafter for 1 min every hour during the first 24 hours followed by 1 min every 2 hours for the remaining 34 days of the experiment. 500 µL sub-samples for the distribution coefficient samples were taken and diluted 10 times to a total volume of 5 mL approximately at 1, 3.5, 5.5, 7.5, 25, 73.5, 169, 336.5, 504, 672 and 840 hours after the initial addition of the Sr-containing SGW and acidified with concentrated HNO₃ (1% volume). Samples from the isotherm solutions were only taken once; after 35 days.

2.7.2 Desorption

The Sr-containing SGW was removed after 35 days and all samples were washed in MilliQ water to remove non-sorbed strontium. Sr-free SGW was then added to the samples to initiate the desorption phase. Because strontium has been found to sorb mainly through ion exchange processes (Park and Hahn 1999) a sequential chemical extraction was applied on the distribution coefficient samples during the desorption using first SGW for 21 days (eight samplings), then 0,5 M CaCl₂ (one sampling) and finally 0,5 M KCl (one sampling) for 1 week each. The isotherm solutions were kept in SGW and sampled once; after 35 days.

Measurements of blank samples (described in the previous section) were used to correct the measured concentrations.

2.7.3 pH and chemical analysis

pH was measured at each sampling event with a pH-meter. All aqueous samples were analysed at Stockholm University for Sr, Al, Fe and Mg (not presented due to experimental problems) with an ICP-OES (Varian Vista) using external calibration curves.

3 Results and discussion

3.1 Composition and rock classification

The drill core samples crushed with the two different methods were first thought to differ in chemical and mineral composition due to their visual appearance. However, the results from the investigation combining mineral determination using point counting on thin sections (Figure 3-1) and analyses of chemical composition performed at ALS Scandinavia AB in Luleå (Figure 3-3) showed only small differences between the samples.

3.1.1 Mineral composition

Point counting of the two thin sections prepared from the drill core samples demonstrates four major minerals – plagioclase ($\text{NaAlSi}_3\text{O}_8 - \text{CaAl}_2\text{Si}_2\text{O}_8$), quartz (SiO_2), K-feldspar (KAlSi_3O_8) and biotite ($\text{K}(\text{Mg}, \text{Fe})_3(\text{AlSi}_3\text{O}_{10})(\text{F}, \text{OH})_2$) – composing 93.0 and 94.5 vol.% of the HV and M samples respectively, see Figure 3-1 and Table A1-12 in Appendix A1.2. The total amount of feldspars is quite similar for the two drill core samples with 66.8 vol.% for HV and 64.2 vol.% for M. The distribution between plagioclase and alkali feldspars on the other hand differs. K-feldspar is more common in the HV sample compared to M while plagioclase shows the opposite behaviour. Furthermore, the M sample contains more quartz and the HV sample more biotite even if the difference for the latter is small (<2%).

3.1.2 Rock classification

The results from the point counting were used to classify the rock according to the IUGS (International Union of Geological Sciences) classification. There are different diagrams for classification based on the texture of the rock and because all grains in the rock were visible without the aid of a microscope the texture is said to be phaneritic (coarse grained) leading to the use of the diagram (Figure 3-2).

As can be seen in Figure 3-2, the rock from both depths, 38 m (HV) and 40 m (M), would be classified as quartz monzodiorite even if the latter is somewhat of a borderline case.

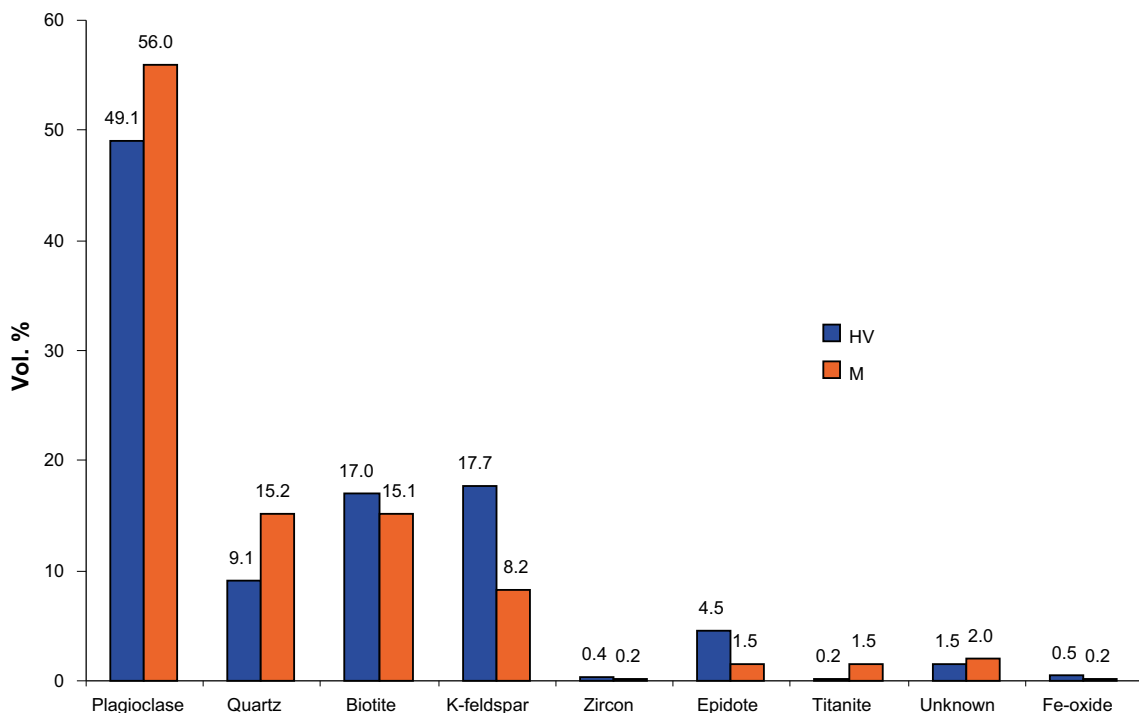


Figure 3-1. The mineral composition of the two drill core samples determined by point counting from thin sections.

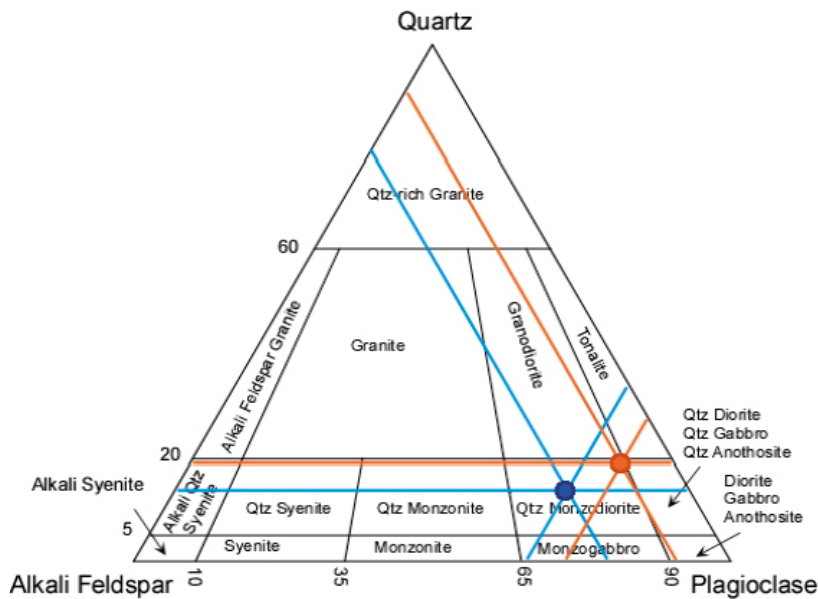


Figure 3-2. IUGS classification of the rock samples. Blue = HV, orange = M.

3.1.3 Chemical composition

Iron and magnesium

The chemical analysis for the unsieved whole rock samples (Figure 3-3) shows that the M sample contains more Fe and Mg than the HV sample which is indicative of larger biotite abundance. This is not detected for the 0.5–1.0 mm samples where the differences in concentrations are negligible.

Furthermore, both the HV and M 0.5–1.0 mm samples have lower Fe compared to the whole rock samples. An explanation for this could be accumulation of some mineral(s) in other size fractions. In the 0.5–1.0 mm size fraction, the selective removal of Fe-containing minerals during crushing/fragmentation is greater for the M sample (~40% decrease in Fe_2O_3) than for the HV sample (~25% decrease). Along with a decrease in Mg for the M samples, this ultimately results in total compositions for the two samples that are less than 5% different from each other (evening out of concentration differences compared to the drill core samples mentioned above). This suggests that the two crushing methods have led to different accumulation of minerals during fragmentation of the rocks.

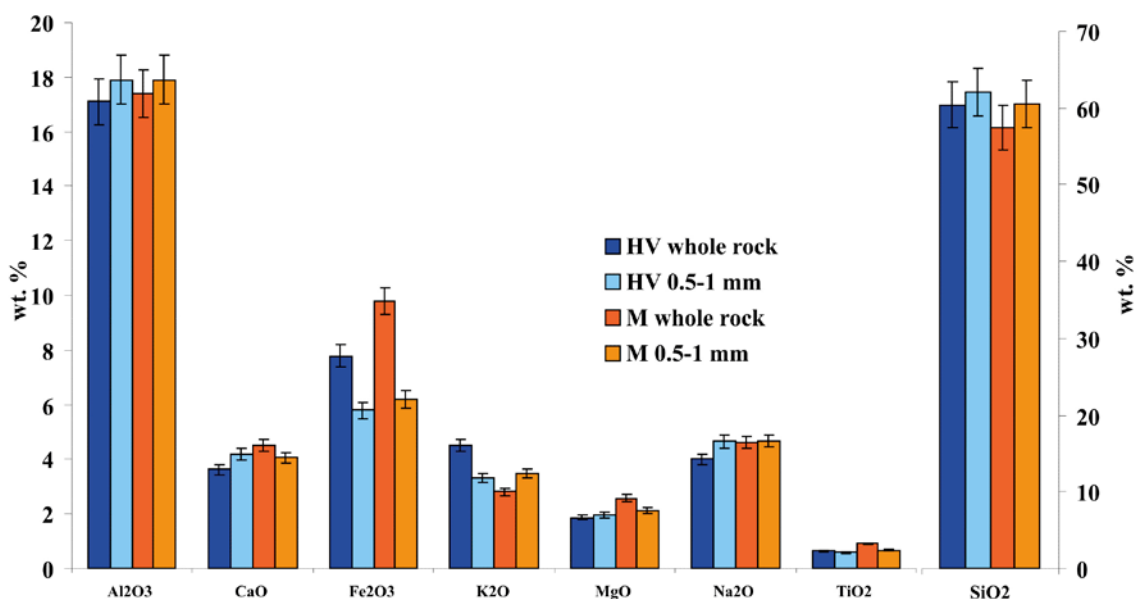


Figure 3-3. Chemical composition of the HV and M whole rock samples (crushed and unsieved drill core sample) and 0.5–1 mm size fraction samples. Error bars of $\pm 5\%$ are included.

However, to confirm this assumed fractionation of mineral(s) in other size fractions, all size fractions should have been investigated. Furthermore, it is noticeable that the HV material has no difference in Mg between the whole rock and 0.5–1.0 mm size fraction samples which would be hard to explain if the decrease in Fe was solely attributable to a decrease in the amount of biotite (which probably accumulates in the finer fractions) as this mineral is easily fragmented and contains both Fe and Mg. The lower Fe content of the crushed samples could therefore in addition be due to a fractionation of epidote and/or titanite, which contain Fe but negligible Mg, and are relatively resistant (less affected by crushing), leading to accumulation in the coarser fractions. The decrease in Fe could be an effect of a lesser amount of Fe-oxide in the crushed sample but since its occurrence in the whole rock is low (≤ 0.5 vol%) this is not very likely.

Potassium, sodium and calcium

For the unsieved whole rock drill core samples, potassium is more abundant in the HV sample (Figure 3-3) which could be due to a larger K-feldspar occurrence in the HV than the M drill core (see Figure 3-1). However, K also occurs in biotite and therefore it is difficult to draw any further conclusions. Potassium increases in the M 0.5–1 mm size fraction and decreases for the HV sample compared to the whole rock drill core sample. This could be an effect of selective accumulation of biotite and/or K-feldspar in different size fractions.

For the unsieved whole rock drill core samples both Ca and Na concentrations are greater in the M sample (Figure 3-3) indicating that M contains more plagioclase. Both elements have increased in the HV 0.5–1.0 mm size fraction which implies accumulation of plagioclase in this fraction while Na in the M sample are practically the same for the whole rock drill core sample and the crushed sample and the concentration of Ca somewhat lower in the 0.5–1 mm fraction.

3.1.4 Conclusions and suggested improvements

The chemical analysis of the unsieved whole rock drill core and the 0.5–1 mm fraction samples and the mineral identification through point counting from the drill core thin sections has led to somewhat different results as can be seen in the summarizing Table 3-1 and Table 3-2. This is an indication of either unrepresentative samples, unreliable methods or both. As mentioned in Chapter 1, the samples are small and the rock type heterogeneous, coarse-grained and porphyritic, which evidently have had effect on the different chemical and mineralogical composition of the samples used for the two methods.

It is possible that crushing the rock has led to the accumulation of some minerals in different size fractions, see Table 3-2, as Fe and Mg have decreased in the 0.5–1.0 mm M sample compared to the whole rock samples whereas Ca and Na have increased in the crushed fraction for the HV sample. For the M material this suggests an accumulation of biotite in either larger or smaller size fractions (most likely smaller due to the brittleness of the mineral), although biotite alone cannot explain the preferential loss of Fe over Mg. Plagioclase may have accumulated in the 0.5–1.0 mm fraction for HV. Without further analyses of additional size fractions it is hard to establish any correlations between particle size and mineral occurrence. However, both crushing methods may have led to the accumulation of different minerals, but in different manners, which indicate that both methods are incapable of producing samples that are representative for the bedrock regarding the chemical composition.

For more reliable results several thin sections should have been prepared and several size fractions as well as larger samples used for chemical analysis to reduce the risk of unrepresentative samples.

Table 3-1. Largest occurrence of different minerals in the drill core thin sections analysed for chemical composition as indicated by the sample name.

	K-feldspar	Plagioclase	Biotite
Chemical analysis	(HV)	M	M
Point counting	HV	M	HV

Table 3-2. Differences in mineral occurrence in the 0.5–1 mm size fraction compared to the drill core samples as interpreted from the chemical composition analyses.

	K-feldspar	Plagioclase	Biotite
M	Small increase	No difference/small decrease	Decrease
HV	Small decrease	Increase	Contradictive results

3.2 N₂ adsorption isotherm and pore size distribution

3.2.1 Classification of adsorption isotherms

The N₂ adsorption isotherms are very similar for the HV and M samples for all size fractions, see example in Figure 3-5, and all isotherms in Appendix 2. They all correspond to the IUPAC (International Union of Pure and Applied Chemistry) classification type IV isotherm (Figure 3-4 left) that show a characteristic hysteresis loop which is associated with mesopores (20–500 Å). The hysteresis loop may exhibit different shapes (Figure 3-4 right) which are thought to be related to the pore structures. It is not completely straightforward to identify the type of hysteresis loop due to the lack of scale in the IUPAC figures but in this case it should be either type H3 or H4. Since H3 is a type observed for aggregates and H4 corresponds to narrow slit-like pores it is H4 that should be the most correct one for the samples in this study (Sing 1982). The desorption curve in Figure 3-5 shows lower amount adsorbed (line with crosses) than the adsorption curve in the end of the adsorption at low relative pressure. This could be due to weathering and release (desorption) of Sr already attached to the samples prior to the experiment, although in very low amounts.

3.2.2 Pore size distribution (PSD)

The pores were divided first into two groups; ca 15–800 Å and >800 Å (Figure 3-7) as reported in the DFT results. The complete PSD of pores with sizes 15–800 Å can be seen in Figure 3-9 to Figure 3-12 and will be discussed further down.

Reports from measurements of the PSD according to DFT can be found in Appendix 2.

A conceptual presentation of common porosity features is found in Figure 3-6.

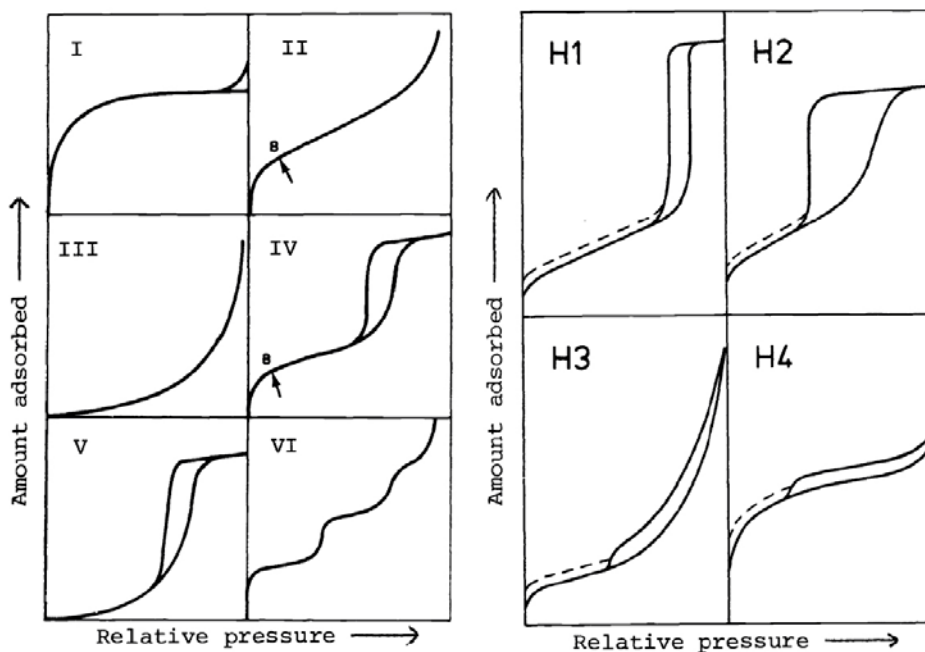


Figure 3-4. Types of physisorption isotherms (left) and of hysteresis loops (right) (from Sing 1982).

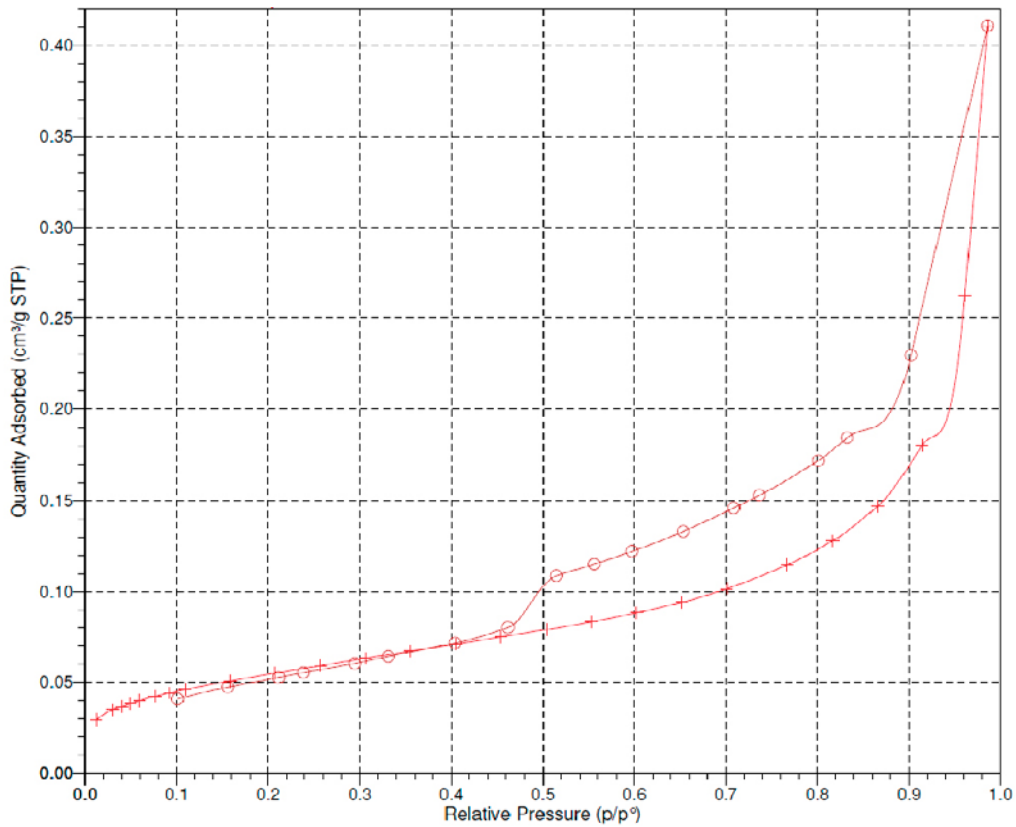


Figure 3-5. Isotherm plot for the M 0.5–1 mm sample.

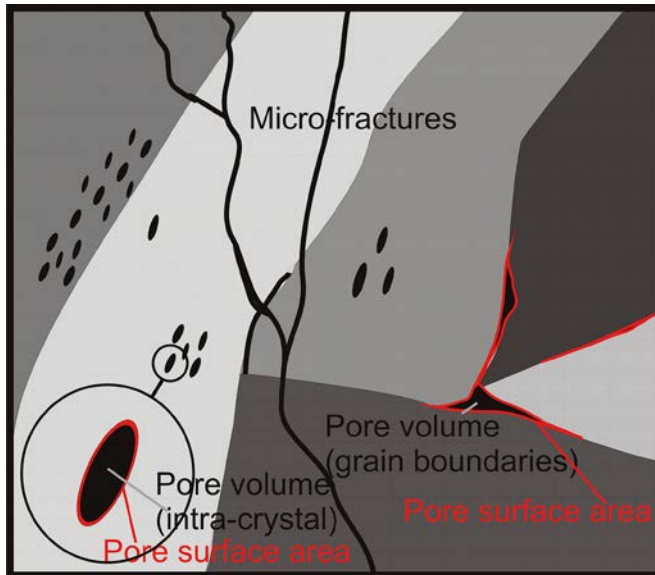


Figure 3-6. Conceptual presentation of porosity features in the rock mass: intra-crystal porosity (with close-up of pore surface area and pore volume), pore volume and pore surface area between grains and micro-fractures through different mineral crystals and along grain-boundaries. Different mineral grains are shown with different colour.

Pore sizes 15–800 Å and >800 Å

For the M sample the surface area for pores with sizes 15–800 Å decreases somewhat with increased particle size over the three smallest size fractions, see Figure 3-7. The 2.0–3.0 mm fraction, on the other hand, opposes this trend. The surface area for pores >800 Å also generally decreases with size from the smallest to the largest fraction for the M sample and what is striking is that these pores are almost non-existing in the 2.0–3.0 mm size fraction. Looking at the percentage distribution between pores of these two size groups (Figure 3-8) one can see that it is very similar for the three smallest fractions with ca 12–14% for pores with sizes 15–800 Å and ca 76–78% for pores exceeding 800 Å. Due to the very small amount of pores >800 Å for the 2–3 mm the smaller pores represent approximately 97% of the total amount.

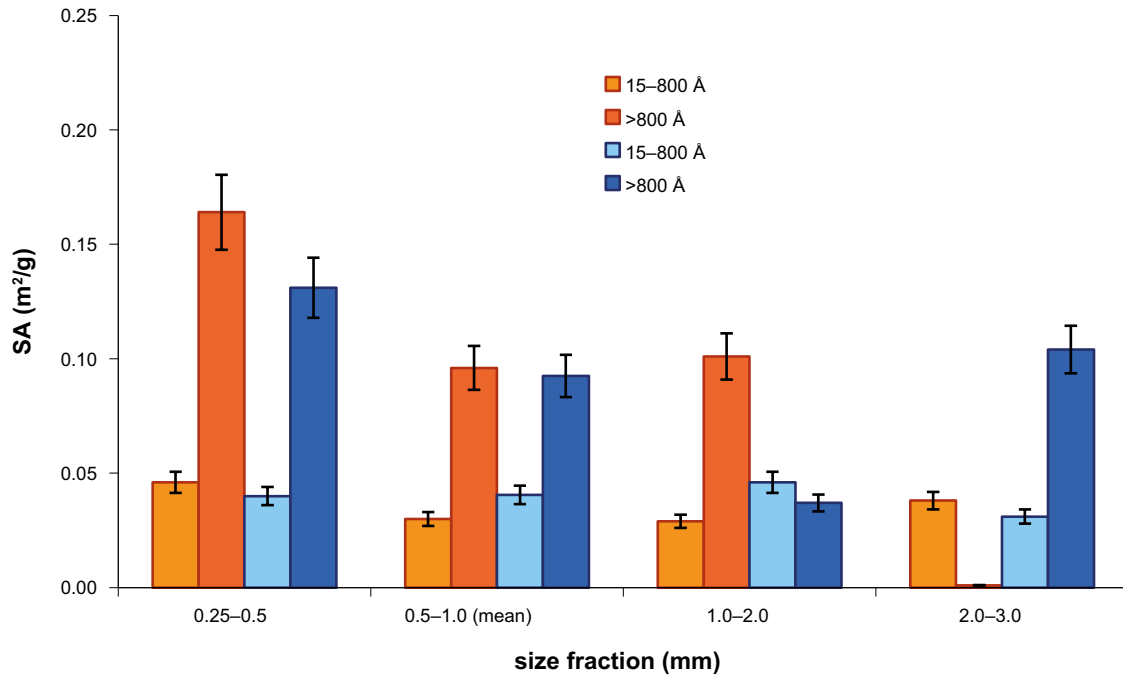


Figure 3-7. PSD for sizes >800 Å and 15–800 Å. Blue = HV, orange = M. The values for the 0.5–1 mm fraction are mean values from two measurements. The actual values were 0.0405 ± 0.0035 Å (HV) and 0.0300 ± 0 Å (M) for pores in the range 15–800 Å and 0.0925 ± 0.0015 Å (HV) and 0.096 ± 0.0040 Å (M) for pores exceeding 800 Å. Error bars show $\pm 10\%$.

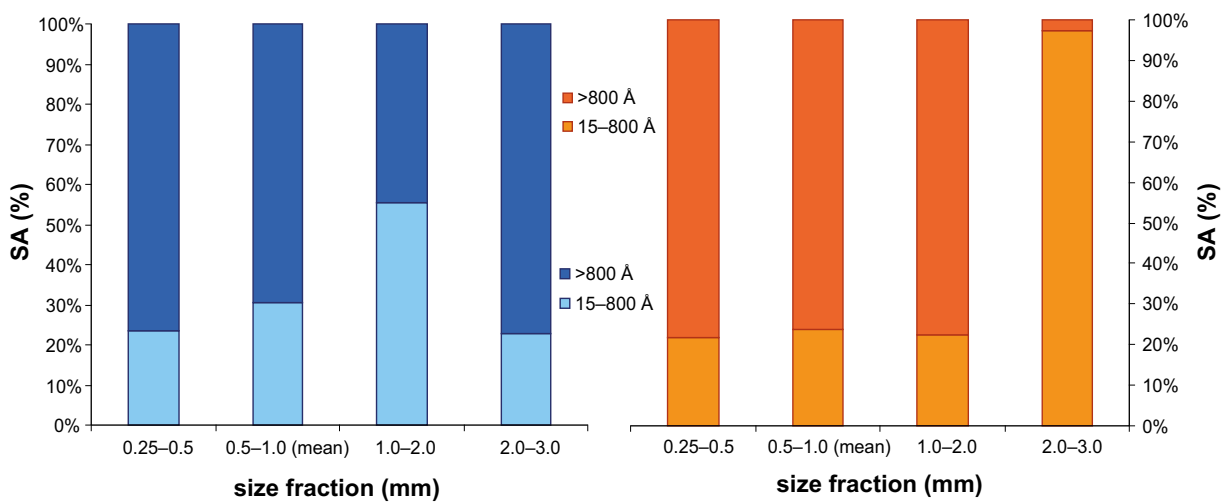


Figure 3-8. Percentage distribution of pores >800 Å and 15–800 Å. Blue = HV, orange = M.

The surface area for pores with sizes 15–800 Å is increasing with increasing grain size for the three smallest fractions of HV samples (opposite behaviour compared to the M samples). On the other hand, the pores exceeding 800 Å for the same fractions decrease, see Figure 3-7, leading to an increased percentage of pores between 15 and 800 Å for HV (Figure 3-8) (although the variability change is generally within 10%). The 2.0–3.0 mm fraction is deviating from this trend since the values of surface area for pore sizes 15–800 Å decrease while the value for pores exceeding 800 Å increases compared to the 1.0–2.0 mm size fraction.

Both HV and M samples show trends of decreasing amount of total pores with increased particle size with the exception of the HV 2.0–3.0 mm sample that has an amount about equal to the HV 0.5–1 mm fraction.

PSD of pore sizes 15–800 Å

Regarding the pores between 15 and 800 Å, the distribution can be seen in Figure 3-9 to Figure 3-12 below. All samples have a significant amount of mesopores (20–500 Å) which is consistent with the IUPAC type IV isotherm discussed in Section 3.2.1.

Pores with sizes 15–20 and 20–40 Å show no consistent difference between the HV and M samples (Figure 3-9 to Figure 3-12), showing distribution of pore surface area over different pore width. The duplicate measurements indicate largest pore size variations in these areas and up to ca 90 Å (Figure 3-10). It is possible that the washing of the samples prior to analysis was not sufficient enough to remove all dust particles leading to these variations. However, for pores with the sizes 90–800 Å the surface area is largest for the HV sample in all cases, see Figure 3-13 (although the difference in the smallest and largest fractions are within the 10% uncertainty of the method), and similarly in the 230–800 Å size span. Furthermore, both the HV and M 0.25–0.50 mm samples show a positive deviation from the other grain sizes in the 230–800 Å size span (Figure 3-13, Figure 3-14, and Figure 3-15), although the M sample is within the 10% uncertainty of values from other grain sizes. The values are 0.020 (HV) and 0.018 (M) m²/g for the 0.25–0.50 mm fraction compared to 0.017 m²/g and 0.013 m²/g for all the larger fractions of the HV and M samples respectively. No other significant differences could be established between the two crushing methods from the pore size distribution and quantity of pores.

3.2.3 Conclusions

- Both M and HV samples show trends for the three smallest size fractions regarding the pore width groups 15–800 Å and >800 Å. For the HV samples the total surface area of pores >800 Å decreases with increased particle size while the surface area for smaller pores (15–800 Å) increases slightly (note that increase is smaller than method error). The M samples generally show a decrease in both 15–800 Å and <800 Å pores from the 0.25–0.50 Å to the two larger fractions leading to a very similar percentage distribution (Figure 3-8). The 2.0–3.0 mm fraction deviates for both HV and M samples, perhaps due to dominance of resistant K-feldspar phenocrysts. Since the surface area for both pore width groups differ for both samples between the grain sizes alteration and/or selectivity is likely to have occurred during both crushing procedures.
- None of the crushing methods have created grains that show similar pore size distributions over the entire spectra of grain sizes (Figure 3-14 and Figure 3-15). This indicates that both crushing methods have led to alteration of the rock.
- The samples crushed with high voltage have more pores compared to the M samples from 90 to 800 Å for all grain sizes, see Figure 3-13. This could indicate that the high voltage crushing is less capable of producing unaltered samples than mechanical crushing but could also be an effect of different starting conditions.
- The fact that the 0.25–0.50 mm size fraction has the largest surface area for the pore width range 230–800 Å might be an indication that pores in this range are formed during continued treatment with both methods. Since the other grain size fractions are more similar to each other in this region it is possible that this effect only occurs after a certain amount of treatment and that the larger grains are unaffected.

Suggestion for further studies: Preferably, further N₂ adsorption measurements would be performed on intact bedrock to compare with the results for the crushed samples to make sure that the observed differences in not an effect of different starting conditions. Larger pores will be discussed further in Section 3.3 (visual investigation with SEM) where comparisons with the drill cores are also made.

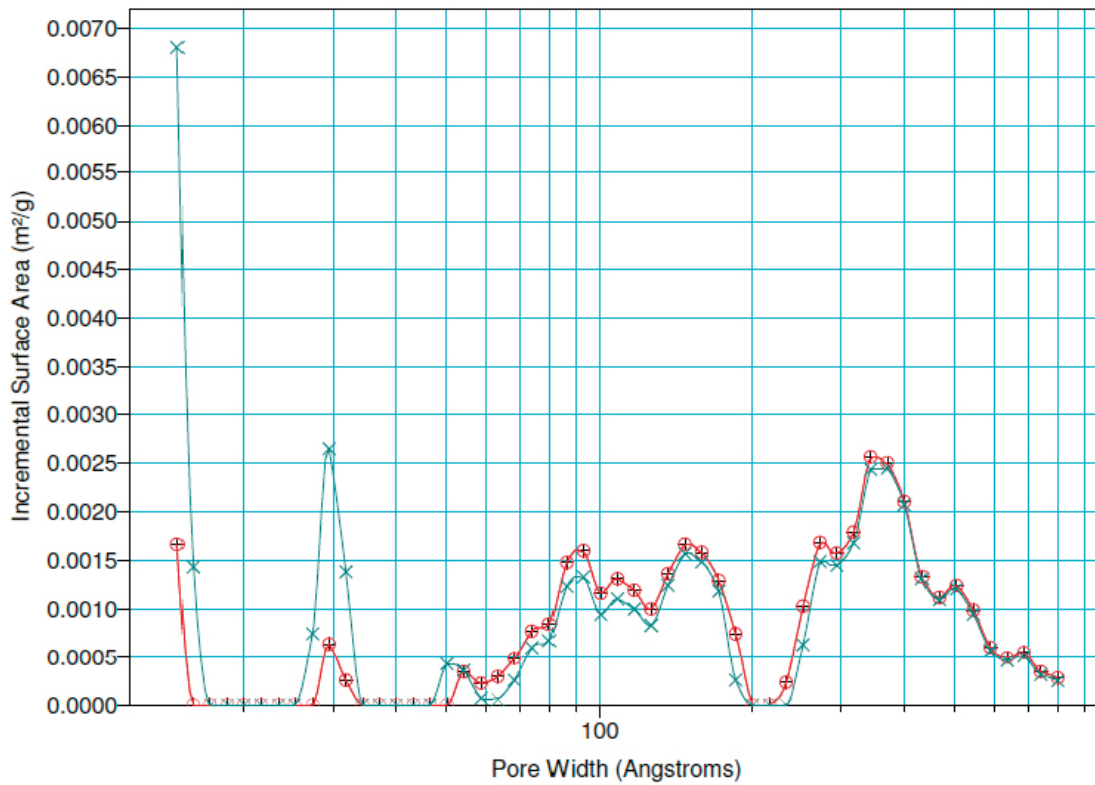


Figure 3-9. Distribution of pore surface area over different pore widths. Particle size: 0.25–0.50 mm; \oplus = HV, \times = M. Uncertainty is $\pm 10\%$.

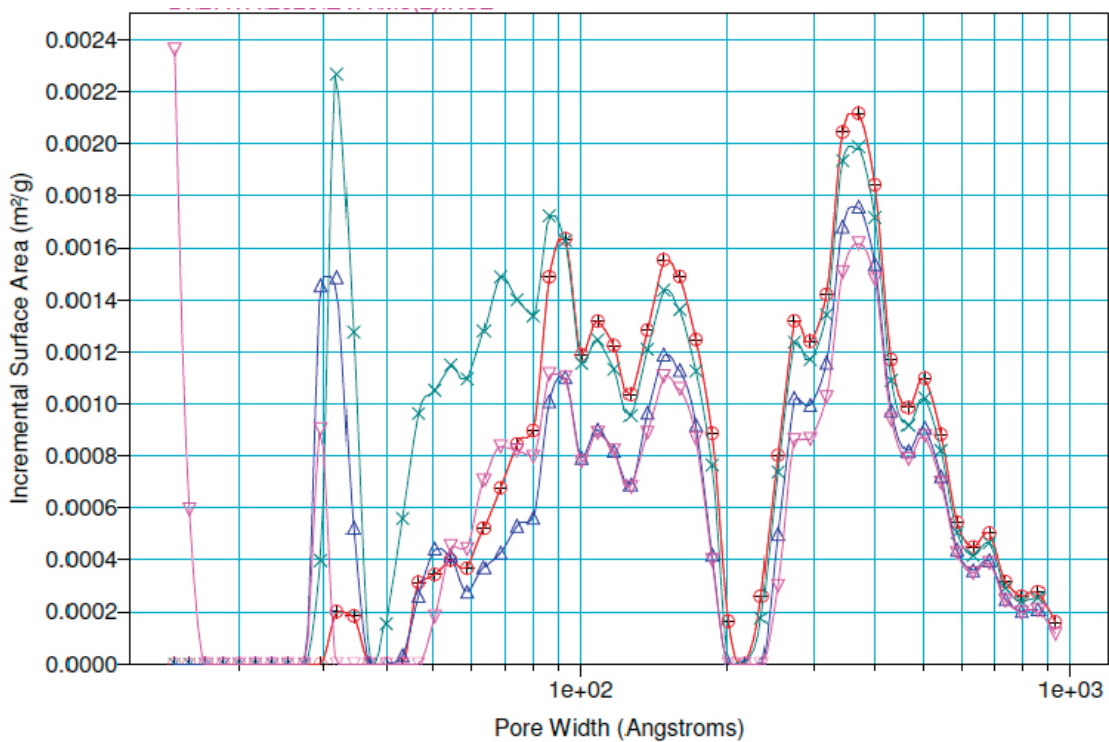


Figure 3-10. Distribution of pore surface area over different pore widths. Particle size: 0.50–1.0 mm; \oplus = HV(1), Δ = HV(2), ∇ = M(1), \times = M(2). Uncertainty is $\pm 10\%$.

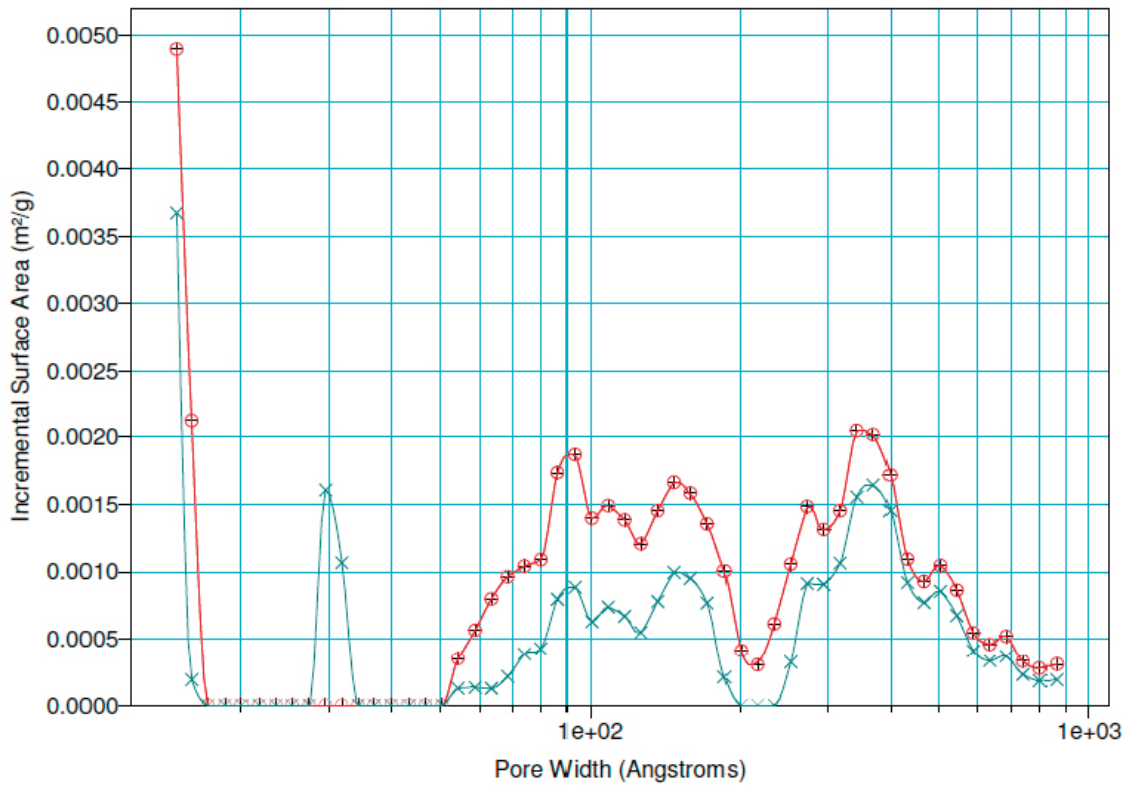


Figure 3-11. Distribution of pore surface area over different pore widths. Particle size: 1.0–2.0 mm; \oplus = HV, \times = M. Uncertainty is $\pm 10\%$.

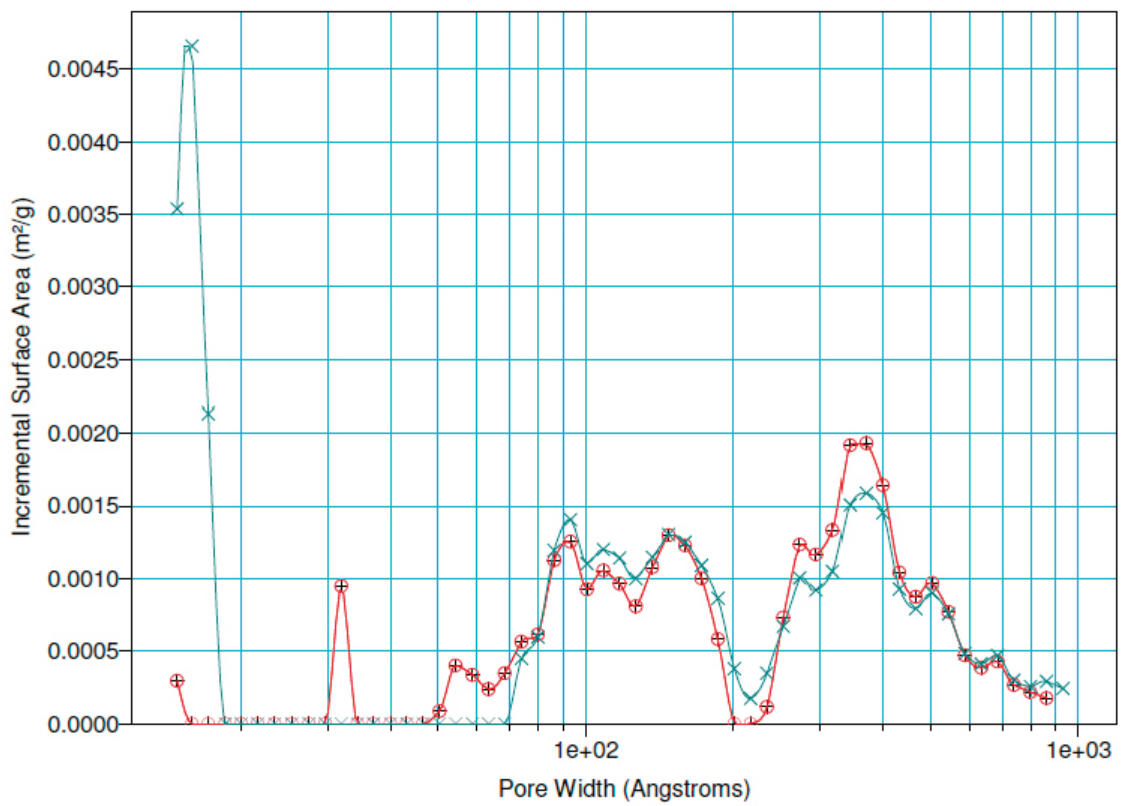


Figure 3-12. Distribution of pore surface area over different pore widths. Particle size: 2.0–3.0 mm; \oplus = HV, \times = M. Uncertainty is $\pm 10\%$.

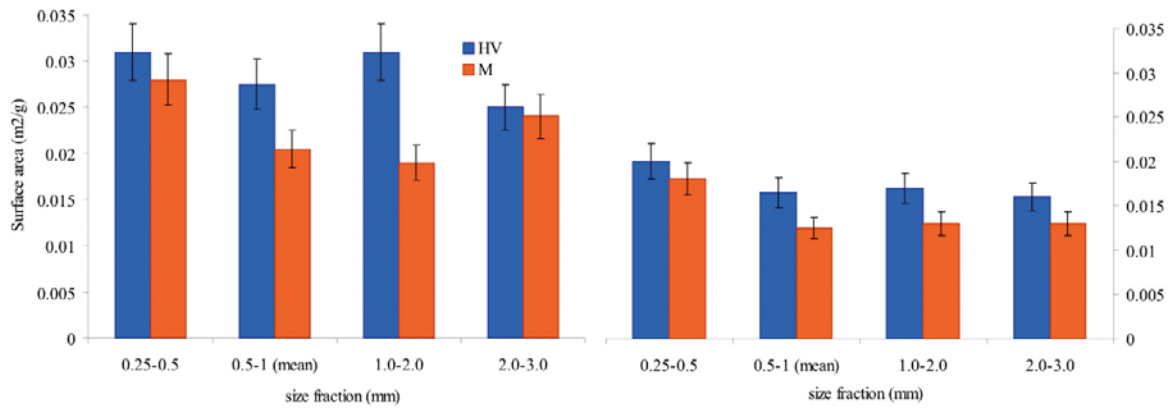


Figure 3-13. Incremental surface area of pores in the range 90–800 Å on the left and 230–800 Å on the right. Error bars represent maximum uncertainty of $\pm 10\%$.

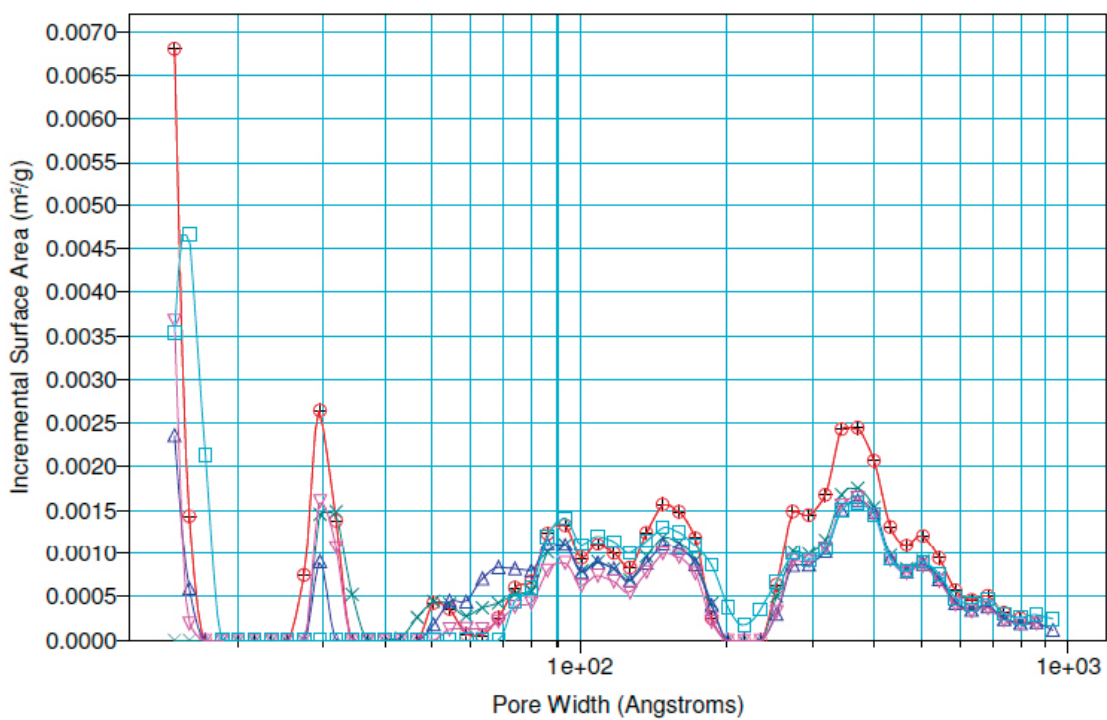


Figure 3-14. Distribution of pore surface area over different pore widths. M samples: \oplus = 0.25–0.50 mm, \times = 0.50–1.0 mm (1), \triangle = 0.50–1.0 mm (2), ∇ = 1.0–2.0 mm, \square = 2.0–3.0 mm. Uncertainty is $\pm 10\%$.

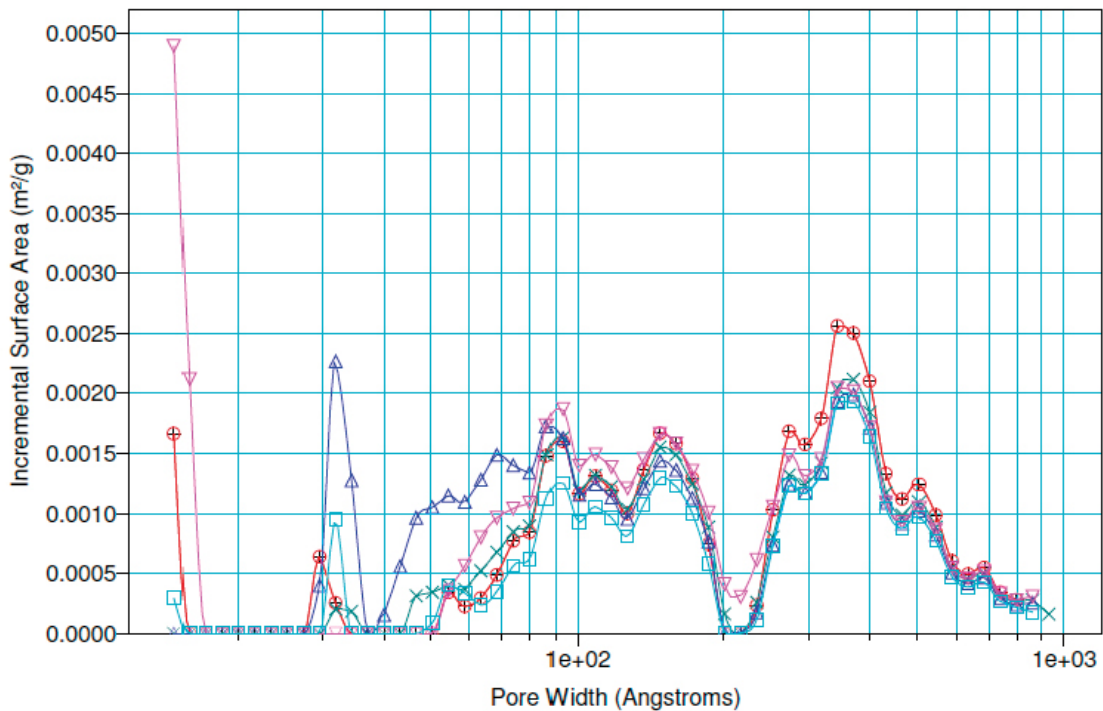


Figure 3-15. Distribution of pore surface area over different pre widths. HV samples. \oplus = 0.25–0.50 mm, \times = 0.50–1.0 mm (1), \triangle = 0.50–1.0 mm (2), ∇ = 1.0–2.0 mm, \square = 2.0–3.0 mm. Uncertainty is $\pm 10\%$.

3.3 Studies of fracturing and alteration using a Scanning Electron Microscope (SEM)

3.3.1 Intact drill core samples

The presence of pores varied to some extent for the two drill core samples; from rather low occurrence (Figure 3-16), to more affected grains (Figure 3-17). Overall there were more grains with a larger occurrence of pores and cracks in the M than the HV drill core samples. The interpretation of larger number of pores in the M sample is however slightly uncertain as this thin section is less evenly polished than the HV sample.

Two types of grain boundaries could be found in both drill core samples. Type I where the minerals were closely attached without any fracturing between them, see Figure 3-17. Type II where fractures occur between the minerals, see Figure 3-18.

3.3.2 M sample, 2.0–3.0 mm fraction

In this sample it is easy to find quartz and feldspar grains with a relatively small amount of visible pores (Figure 3-19). It is possible that these grains have been more resistant to the mechanical crushing and therefore are more common in the largest fraction (than in smaller fractions described below). The low amount of pores may, at least partially, explain the low value for surface area of pores exceeding 800 Å for this fraction (Figure 3-7) since the width of these pores are in the approximate range of 0.1–2 µm, see Figure 3-19.

For some of the mineral grains with low pore occurrence there was no difference between the fracture surface and the inner area of the grain (Figure 3-20, left) but for most of them the grain boundary had been altered through an increase in cracks with lengths in the range of several µm (Figure 3-20, right). Mechanical crushing may lead to localized strain bands with an adjacent zone of micro-cracks and that fractures form when enough micro-cracks connect (André 2009). This could lead to the formation of grains with disturbed grain boundaries with both fractures and micro-cracks.

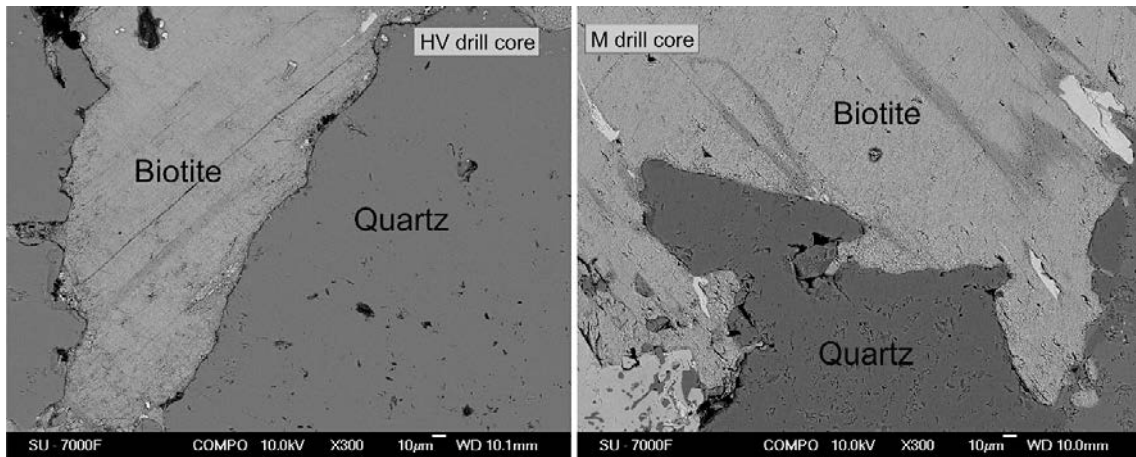


Figure 3-16. HV on the left and M on the right. Examples of quartz grains (darker grey colour, lighter grey = biotite) with relatively low crack occurrence.

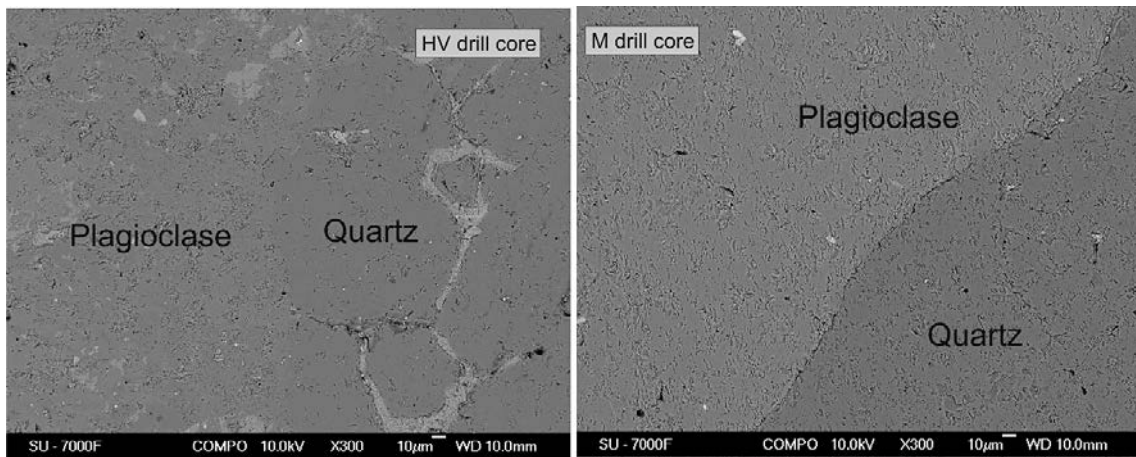


Figure 3-17. HV on the left and M on the right. Examples of quartz (right side on both pictures) and plagioclase grains (left side on both pictures) with a relatively large amount of cracks/pores. Relatively poor polishing on the right thin section. Grain boundary is of Type I.

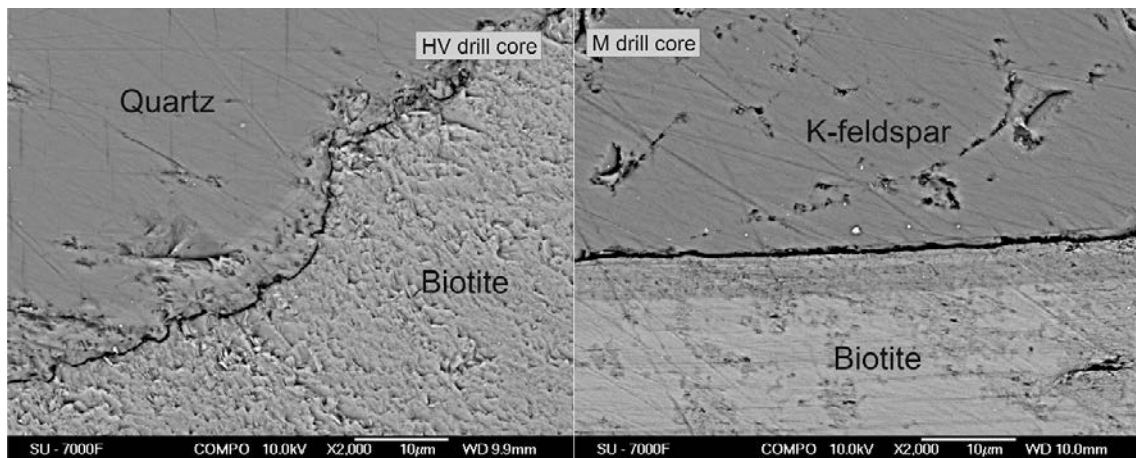


Figure 3-18. Type II, fractured grain boundaries.

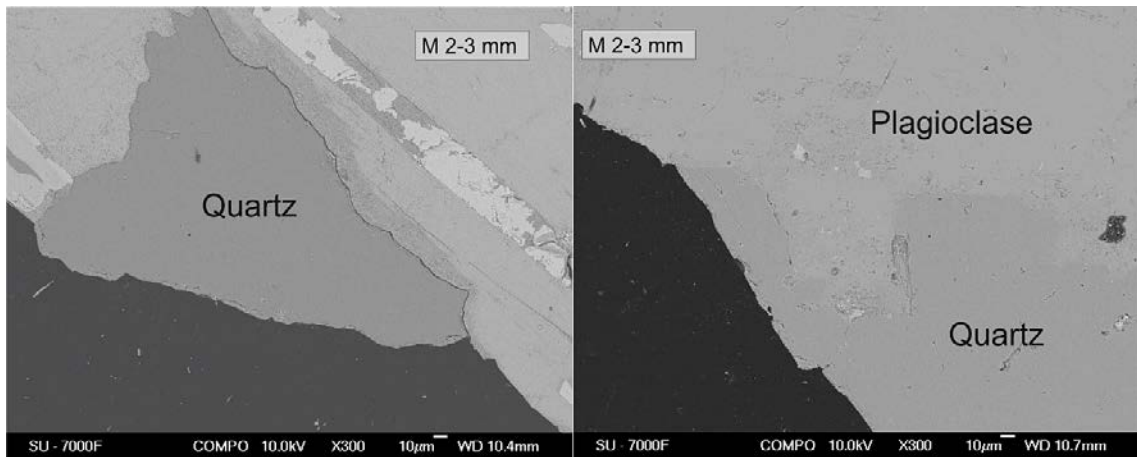


Figure 3-19. Examples of grains with low amount of pores. Dark coloured area is epoxy.

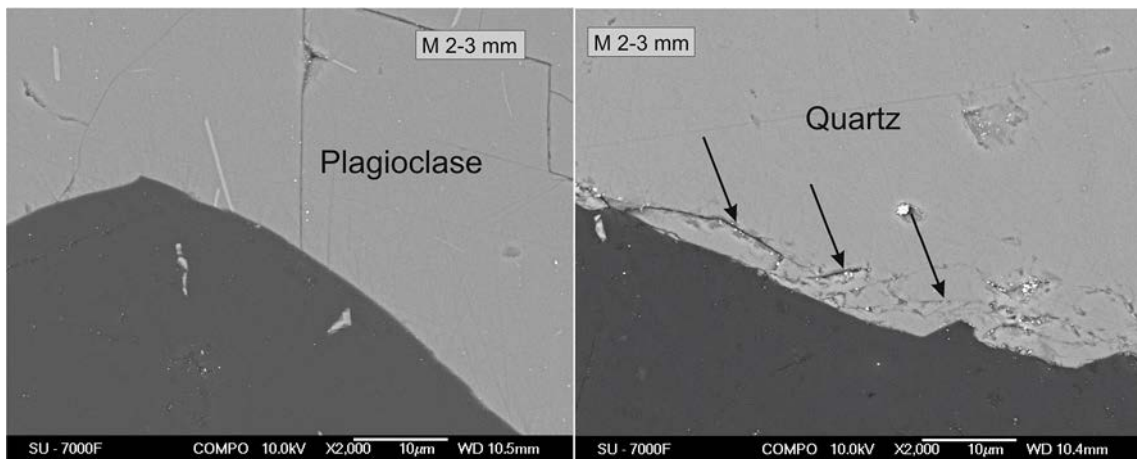


Figure 3-20. Unaltered plagioclase grain boundary on the left, affected quartz on the right.

Grains with a larger pore occurrence for quartz and feldspars were also found (Figure 3-21) even if the smoother ones dominated. The disturbed zone at the grain boundary was found on most grains examined.

Many biotite grains were markedly affected and sheets tended to separate close to the grain boundary (Figure 3-22). Less affected biotite grains were also found (Figure 3-23) even if they were not as common. Noticeable is also that the biotite grains, in similarity with feldspars and quartz, had a low pore occurrence and that the grain interiors tended to be relatively smooth.

Larger cracks, ranging from about ten up to several hundred μm were also found (Figure 3-24). These were most frequent relatively close to the grain boundaries and within grains rather than between grains. Some larger cracks were however located between mineral grains (Figure 3-25, left and Figure 3-19, left) but examples of cracks going straight through a mineral were also found (Figure 3-25, right).

Fractures in biotite grains did not only occur between sheets where the binding energy is low but also perpendicular to the cleavage plane (Figure 3-24).

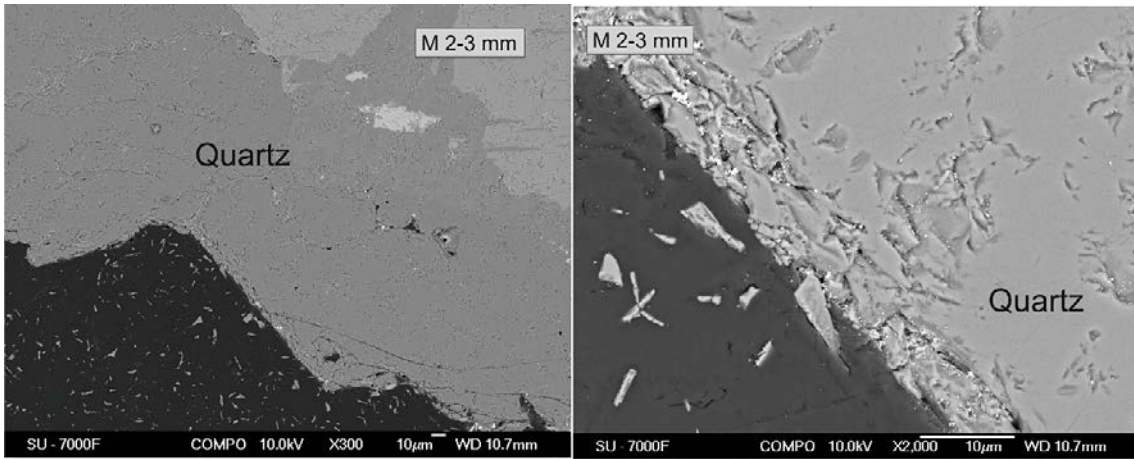


Figure 3-21. An example of quartz with larger pore occurrence. The increased amount of cracks at the grain boundary can be spotted on the right. The porous occurrence of the left quartz grain to the right is probably partially due to poor polishing at this specific area of the thin section.

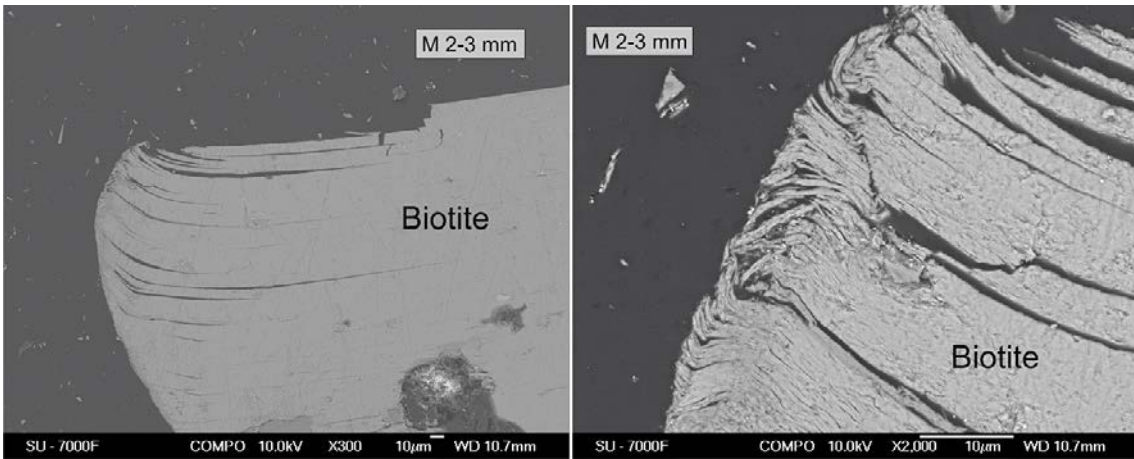


Figure 3-22. Biotite grain boundaries. Notice how the sheets separate close to the grain boundary.

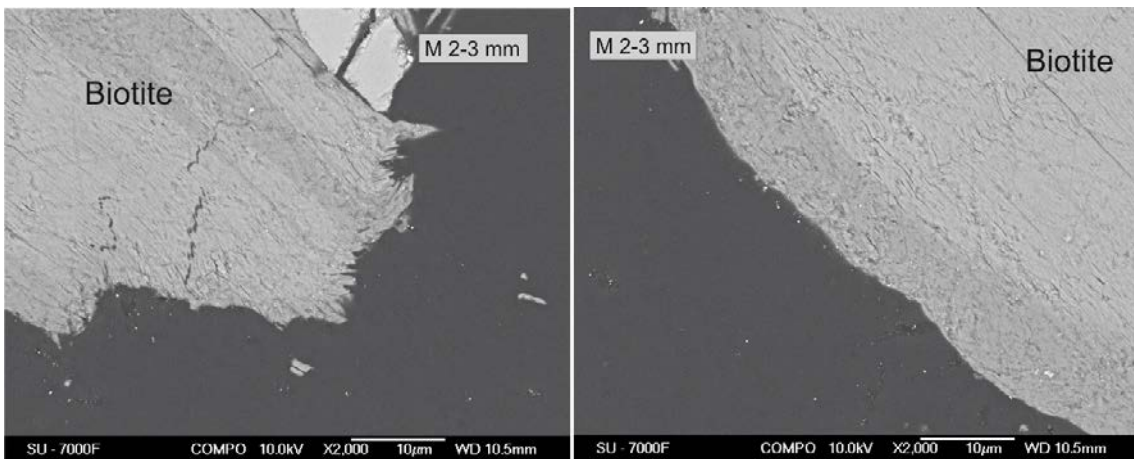


Figure 3-23. Examples of biotite that is practically unaffected at the grain boundary.

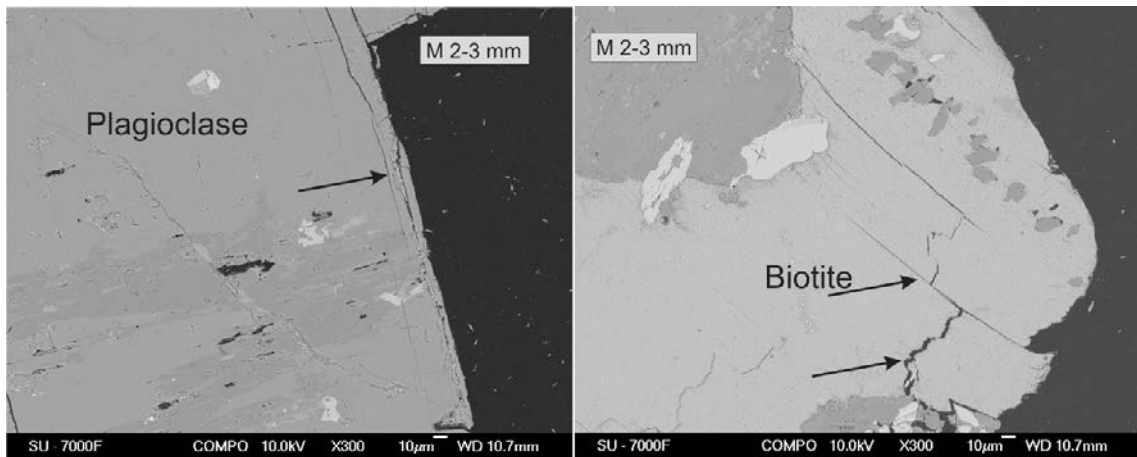


Figure 3-24. Left: plagioclase with cracks parallel to grain boundary. Right: biotite with do not only occurring between the sheets but also perpendicular to them, see also Figure 3-23, left.

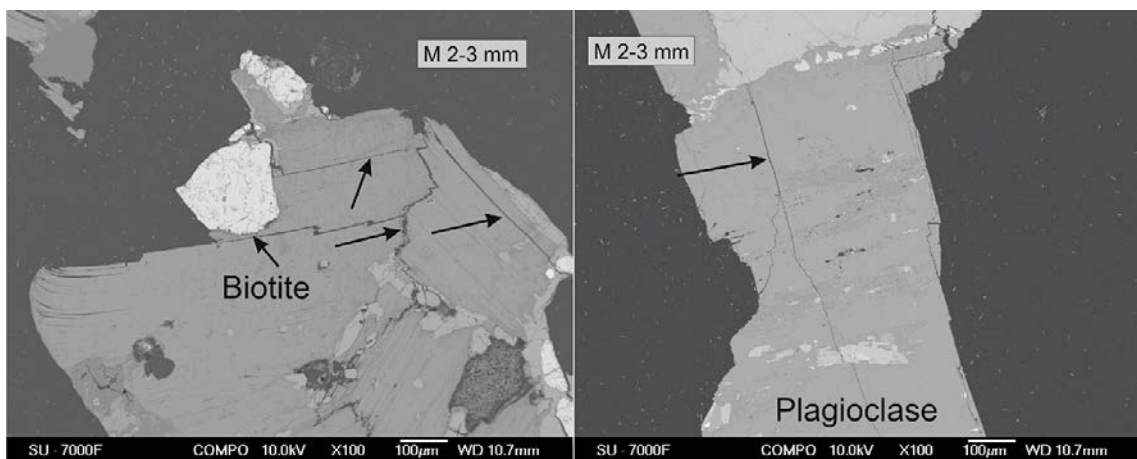


Figure 3-25. Larger cracks between biotite grains on the left and within a plagioclase grain on the right.

Summary and conclusions for M 2.0–3.0 mm

- The M 2.0–3.0 mm sample generally contains quartz and feldspar grains with a relatively small presence of pores within the grains compared to both the M drill core sample and the smaller fraction (see Sections 3.3.1 and 3.3.4). This could be an effect of these grains being more resistant to the mechanical crushing and therefore overrepresented in the larger grain fraction.
- Most grain boundaries have an increased amount of cracks compared to the interior of the grains. Since these cracks have not been spotted in the drill core sample it is possible that their appearance is an effect of the mechanical crushing subjecting the material to high stress. However, one should not exclude the possibility that at least some of these cracks may have formed during the preparation of the thin section.

3.3.3 HV sample, 2.0–3.0 mm fraction

The selectivity of grains with a low pore occurrence that was found to have happened for the M 2.0–3.0 mm sample was not seen for the HV sample partially due to that the polishing of the HV sample was less satisfactory than for the M sample making a thorough comparison between these two samples of this fraction difficult. Also, in contrast to the M sample (Figure 3-20 and Figure 3-21), most grain boundaries showed no or little increase in cracks in the μm range (Figure 3-26 and Figure 3-27).

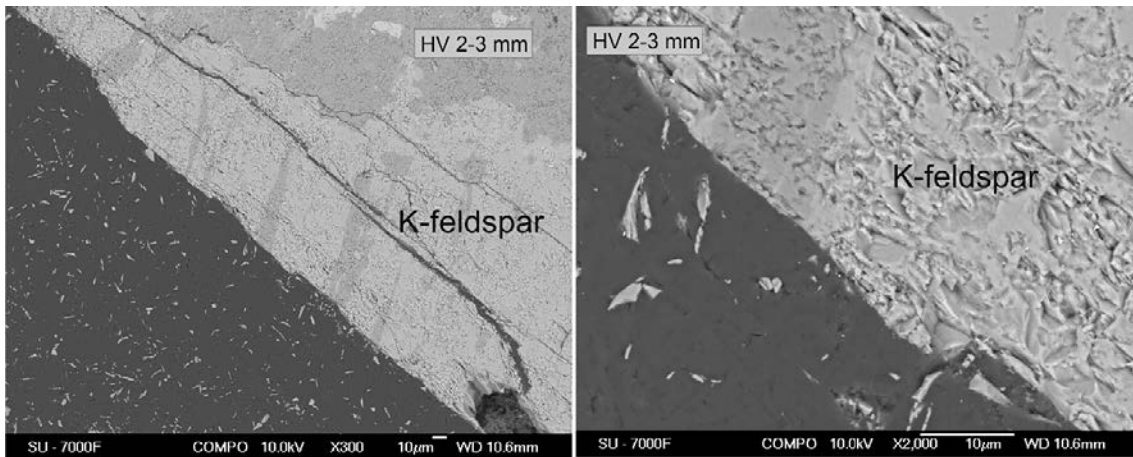


Figure 3-26. K-feldspar from the same grain boundary at different magnification. There is no sign of increased crack occurrence close to the grain boundary compared to the interior.

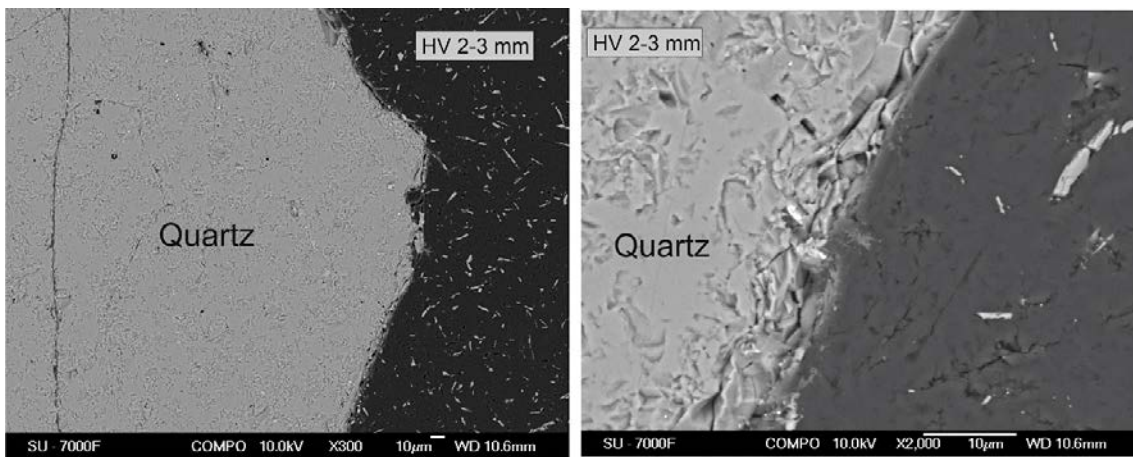


Figure 3-27. Example of quartz grain with slight increase in crack frequency close to the grain boundary. Poor polishing is observed in the highly magnified right image.

Biotite grains were less affected at grain boundaries compared to the M sample even if examples with sheet separation close to the grain boundary were found, see Figure 3-28. Regarding the grain interiors, the amount of pores was higher for the HV sample than the M sample, but due to the difference in degree of polishing between these thin sections, this observation is uncertain.

The larger fractures ranging from about ten up to several hundred μm found in the M sample were found to be even more common in the HV sample. Also, they tended to a larger extent to occur in the middle of grains (Figure 3-29) compared to the M sample. Examples where these cracks occurred more frequently close to the grain boundary were also found (Figure 3-30) even if the former were more common.

Summary and conclusions, HV 2.0–3.0 mm fraction

- For the HV sample there is no sign of selectivity of fracturing along grain boundaries of certain type of grains (as was the case for the same size fraction of the M sample, see Section 3.3.2) and no or little increase in cracks in the μm range close to the grain boundaries. Furthermore, there are fewer biotite grains with sheet separation close to the grain boundary compared to the M sample. This could indicate that the high voltage crushing is less destructive than the mechanical crushing.
- However, since the larger fractures occur to a greater extent in the HV sample it seems more likely that both crushing methods have had an altering effect on the grains even if in different manners.

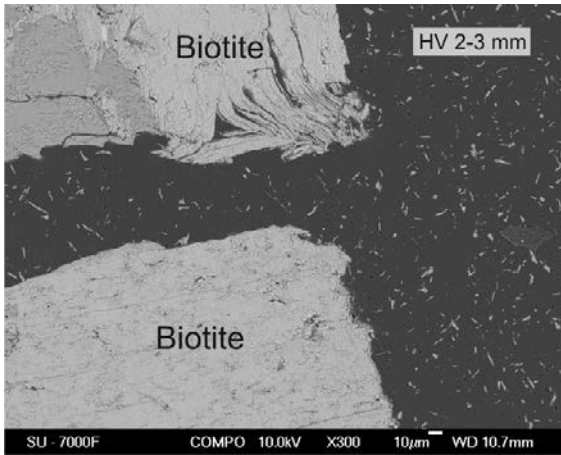


Figure 3-28. Examples of biotite grains. The lower grain shows no separation of the biotite sheets while the upper is more affected.

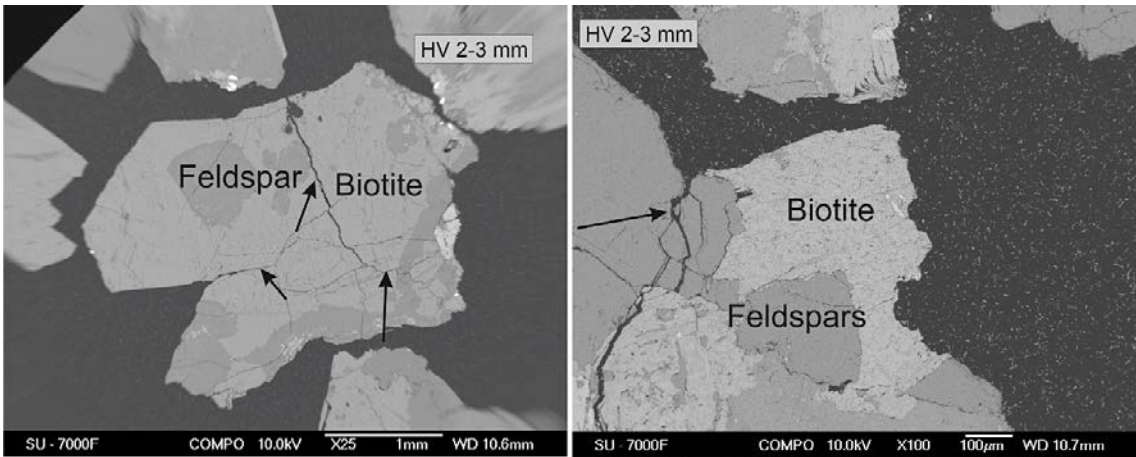


Figure 3-29. Examples of larger fractures.

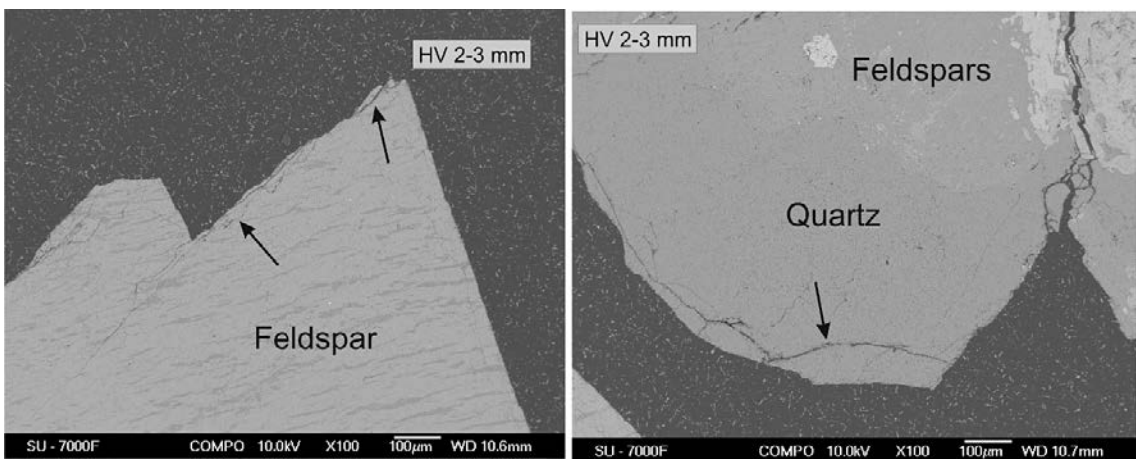


Figure 3-30. Examples of larger cracks occurring close to the grain boundary.

3.3.4 M sample, 0.5–1.0 mm fraction

The M 0.5–1.0 mm sample had a markedly different appearance compared to the larger fraction examined. Firstly, the pores in the width range of approximately 0.1–2 μm that were low in occurrence for the 2.0–3.0 mm fraction sample were found in all quartz and feldspar grains, see example in Figure 3-31. However, the polishing of this thin section is poor, and an uncertain degree of pores can be artefacts from the polishing and therefore the increase in porosity is uncertain, in contrast to micro-fracturing which is visible even if polishing is poor and which cannot be misinterpreted as artefacts from the polishing. The cracks with lengths in the μm range that were found to be present at grain boundaries in the largest fraction were not as common in the 0.5–1.0 mm fraction even if they did appear in some cases. The appearance of these cracks was also somewhat different from those in the larger fraction. The length was overall shorter and the width somewhat more narrow. Their shape together with the higher presence of pores compared to the 2.0–3.0 mm fraction made these cracks easier to spot at a higher magnification, see example in Figure 3-32 ($\times 5,000$ magnification).

Furthermore, the interior of biotite grains also appeared much richer in pores compared to the larger size fraction, see Figure 3-33, compare to Figure 3-22 and Figure 3-23, but this may to an unknown extent be due to poor polishing. There was, however, little or no tendency for the sheets to separate close to grain boundaries (Figure 3-34) compared to the 2.0–3.0 mm fraction (Figure 3-22). Larger fractures penetrating the grains were found, though exclusively between sheets (Figure 3-33 and Figure 3-34). Cracks perpendicular to sheets that were found for the larger fraction (e.g. Figure 3-23, left), were absent in the 0.5–1.0 mm fraction.

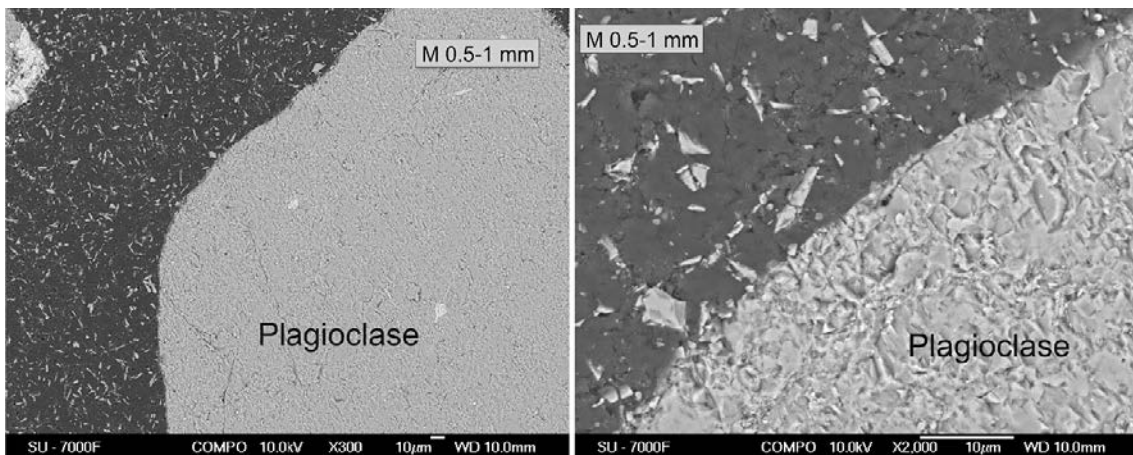


Figure 3-31. Example of a plagioclase grain. Note the large amount of pores present, although the poor polishing makes it difficult to estimate how much of this porosity that originates from poor polishing and how much that originates from the crushing.

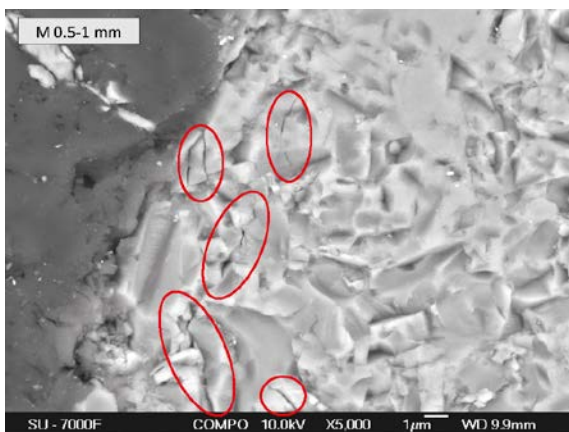


Figure 3-32. Cracks in the μm range.

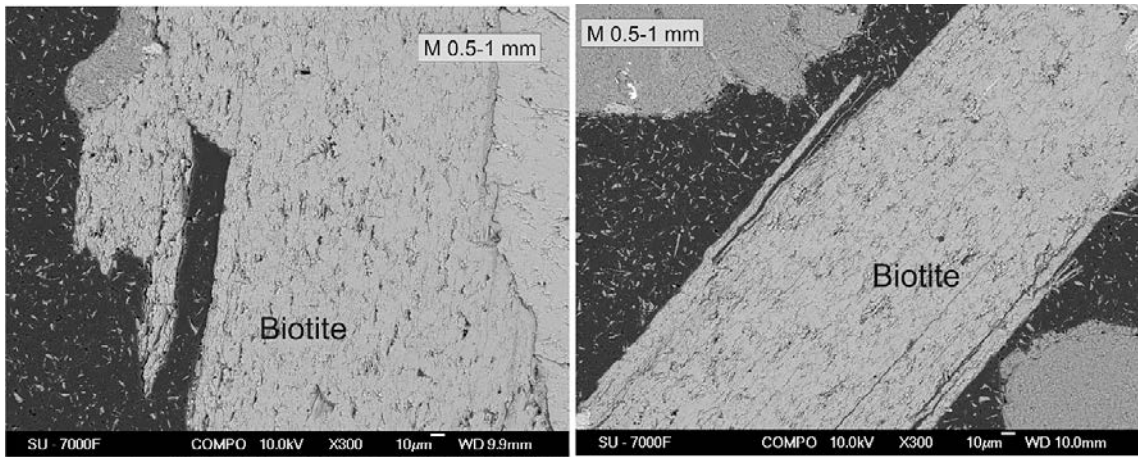


Figure 3-33. Examples of biotite grains.

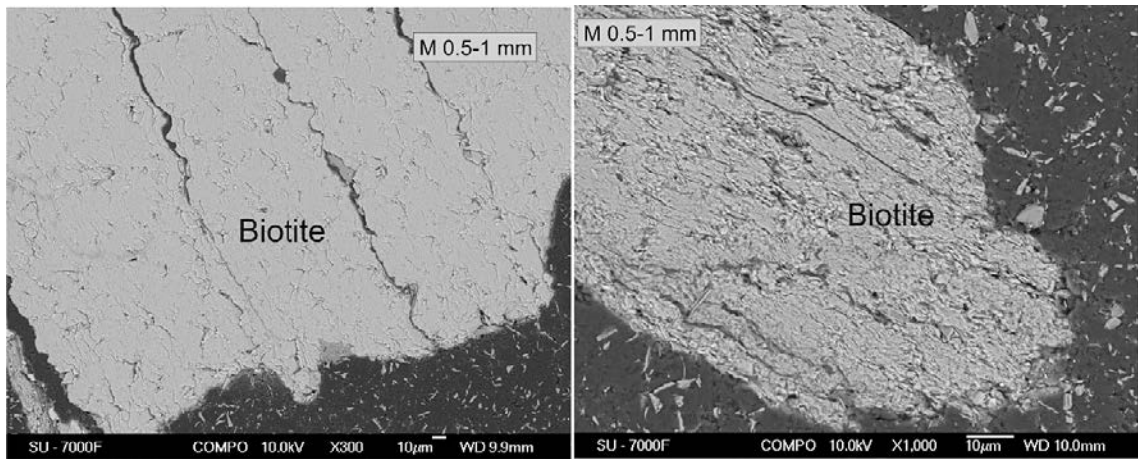


Figure 3-34. Examples of biotite grains. Note the general absence of sheet separation at grain boundaries as seen in the larger fraction.

Larger fractures were found in quartz and feldspar grains as well (Figure 3-35) though they could not be found to appear more regularly close to grain boundaries as was the case for the larger fraction. They occurred both randomly and along cleavage planes for feldspar minerals.

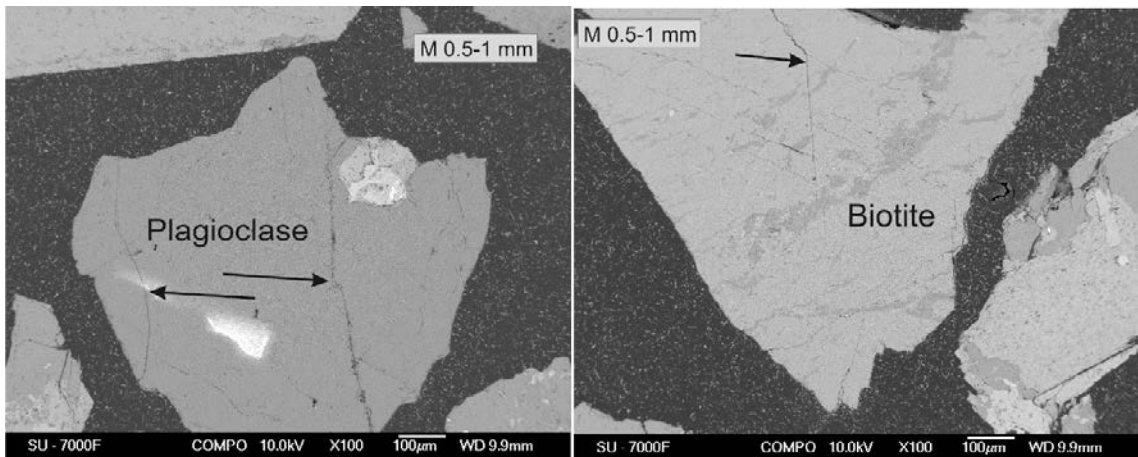


Figure 3-35. Larger cracks penetrating grains of quartz (left) and plagioclase (right).

Summary and conclusions, M sample 0.5–1.0 mm fraction

- The M 0.5–1.0 mm sample was found to be rich in pores in the approximate size range 0.1–2 μm . The pores were widely spread across the entire grains of quartz and feldspar and also appeared in biotite minerals. The occurrence of these pores were much larger compared to the 2.0–3.0 mm fraction. This may be an effect of pore-rich minerals being more prone to fragment, using mechanical crushing, than more solid ones leading to the overrepresentation of these grains in the smaller fraction. One cannot exclude the possibility that at least some of the pores have been created during the crushing since their occurrence is high also when comparing with the drill core sample. However, the poor polishing of this thin section makes the interpretation of pore occurrences very uncertain for this sample.
- In comparison with the 2.0–3.0 mm fraction the smaller grains did not seem as altered at the grain boundaries with regards to μm sized cracks. Even if it cannot be verified it is possible that, due to the larger amount of pores, fractures close to the grain boundaries have more easily been connected leading to the formation of new small grains without applying so much of a mechanical force.
- Cracks perpendicular to the orientation of biotite sheets were not found in the 0.5–1.0 mm fraction. This could be an effect of the formation of new grains with these cracks found in the 2.0–3.0 mm fraction as fresh grain boundaries. This is especially possible since these cracks should be the most obvious places for fragmentation to occur when applying a mechanical force.
- Larger fractures in quartz and feldspar crystals did not appear specifically at grain boundaries as was the case for the larger fraction. This could be merely an effect of the size of the particles since mechanical crushing is likely to lead to a larger percent of a grain being altered with decreasing particle size (André 2009).

3.3.5 HV sample, 0.5–1.0 mm fraction

The 0.5–1.0 mm HV sample was apparently quite porous in the size range of approximately 0.1–2 μm (Figure 3-36). These pores can be considered to be somewhat more common in the 0.5–1.0 mm fraction compared to the 2.0–3.0 mm, although the rather inconsistent polishing of the thin sections make straightforward comparisons of these thin sections difficult, and overall makes it difficult to distinguish whether the pores are natural pores or just uneven parts of poorly polished mineral grains. Grain boundaries tended to be altered to the same extent as the larger fraction, *i.e.* no or just a slight increase compared to the interior of the grains (Figure 3-37 and Figure 3-38). The short and narrow cracks found in the M sample in the same size fraction (Figure 3-32) were not seen for the HV sample.

For biotite, pores were detected within grains (Figure 3-37) about to the same extent as the M 0.5–1.0 mm sample (Figure 3-31) and somewhat more than for the larger HV fraction (Figure 3-28). Larger fractures were found between biotite sheets (Figure 3-39) but no spreading of the sheets close to grain boundaries was detected (Figure 3-40, cf. Figure 3-24 (M 2.0–3.0 mm) and Figure 3-27 (HV 2.0–3.0 mm)). Cracks perpendicular to the cleavage plane were almost completely absent but a few examples were found (Figure 3-39, right).

Larger fractures, in the range of tens of μm to the same size as the grains, were also found in quartz and feldspar grains and to a relatively large extent. Their occurrence and placement was about the same as for the larger fraction, *i.e.* some fractures were present mainly close to grain boundaries (Figure 3-41) but most fractures occurred in the middle of grains (Figure 3-42). Fractures seemed to have formed both randomly and along cleavage planes.

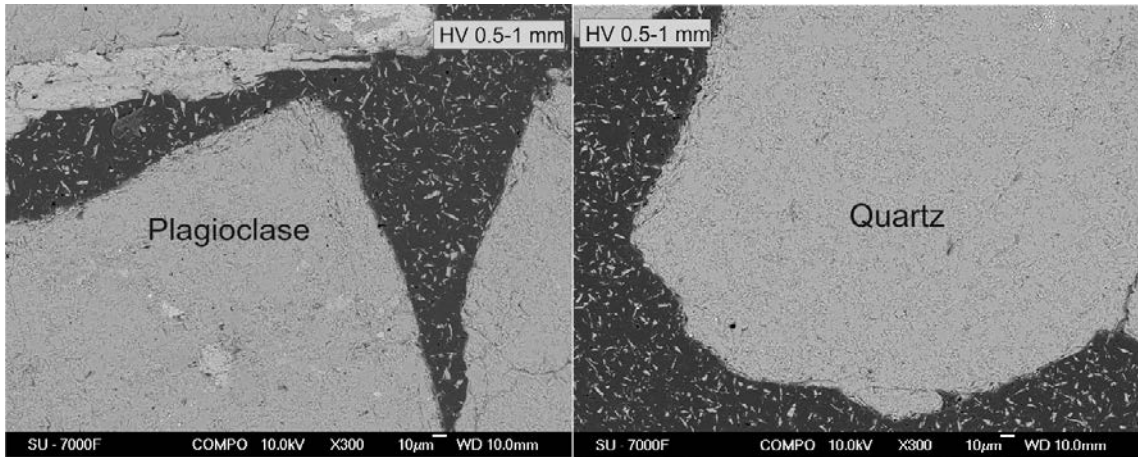


Figure 3-36. Plagioclase (left) and quartz (right). The interior of the grain is quite porous in the approximate 0.1–2 μm pore width range, however, this is mainly due to poor polishing.

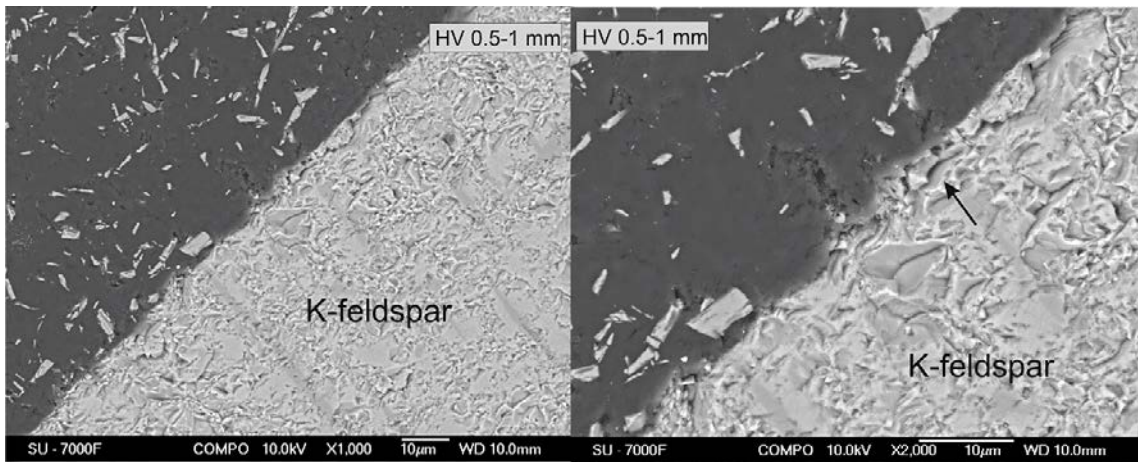


Figure 3-37. Example of a K-feldspar grain at two different magnifications. At the grain boundary there is only slightly (arrow), if any, increased alteration compared to in the interior of the grain. However, the uneven thin section surface (poor polishing), makes a thorough investigation of fracturing at the grain boundary difficult. A slightly better polished area in the image below illustrates these features better.

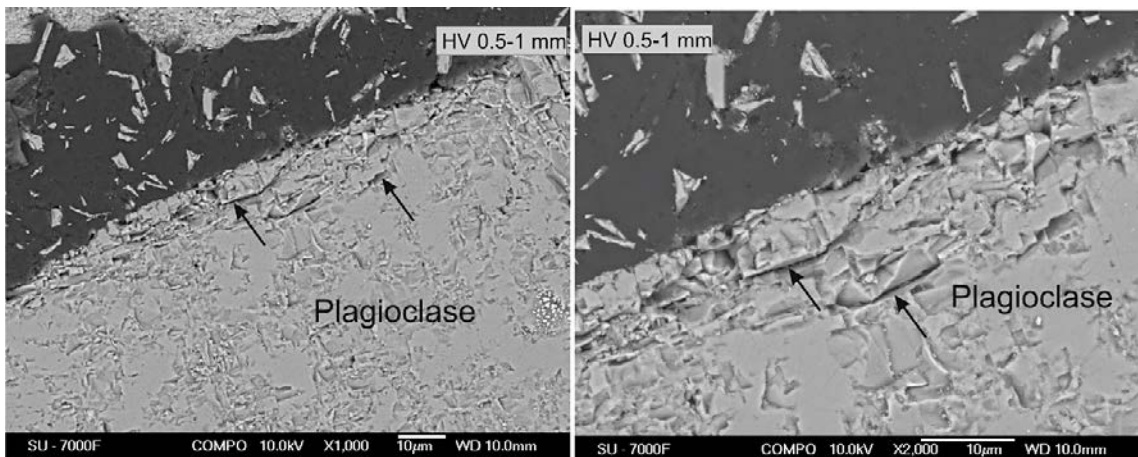


Figure 3-38. Example of a plagioclase grain with increased amount of cracks in the μm range at the grain boundary.

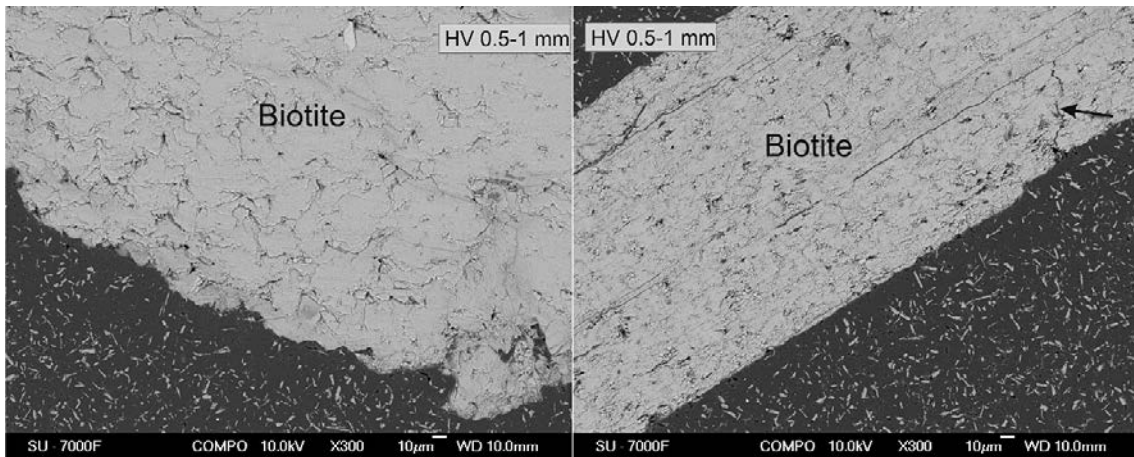


Figure 3-39. Examples of biotite grains where pores within the grains are somewhat more common compared to the larger fraction. Note the crack perpendicular to the cleavage plane on the right picture (arrow).

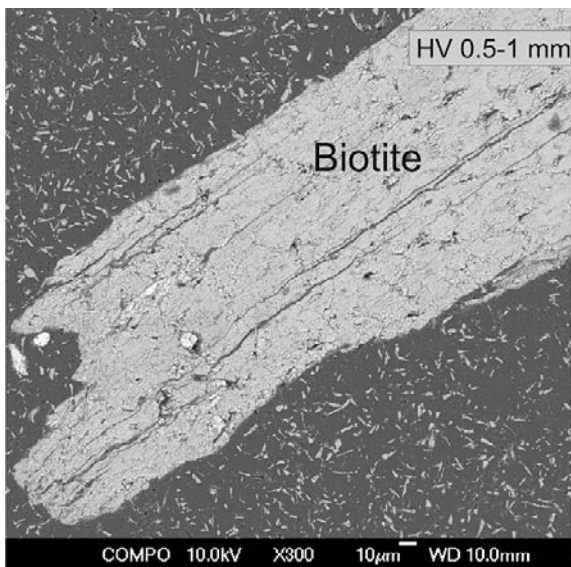


Figure 3-40. Example of fractures occurring between biotite sheets. There is no spreading of the sheets close to the grain boundary as was the case for the larger fractions of both M and HV samples.

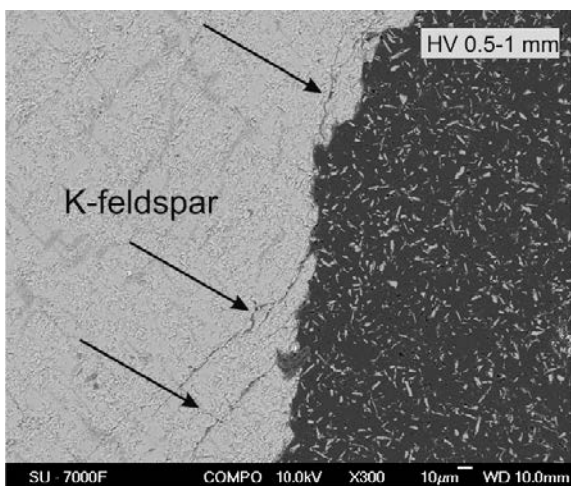


Figure 3-41. K-feldspar with larger fractures (arrows) close to the grain boundary.

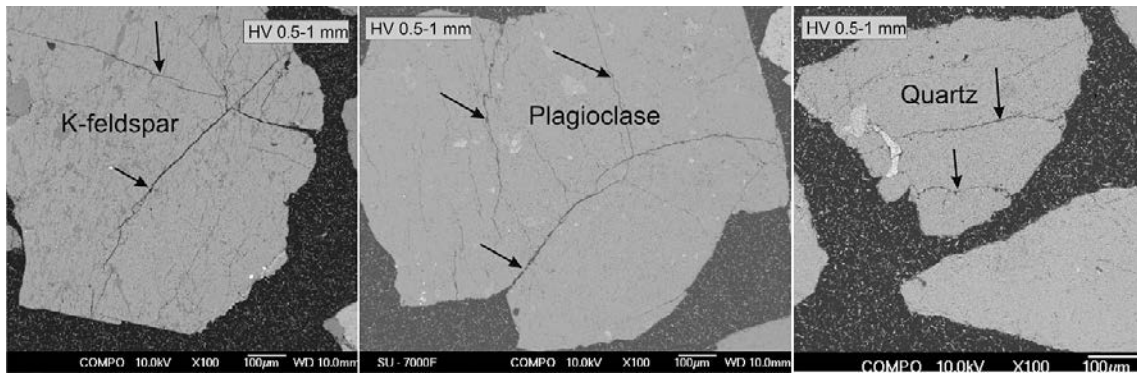


Figure 3-42. K-feldspar, plagioclase and quartz crystals with larger fractures penetrating the entire grains (arrows).

Summary and conclusions, HV sample, 0.5–1.0 mm fraction

- Although there is difficulty in comparing porosity between thin sections due to inconsistent degree of polishing, there is an indication of an increase in porosity of 0.1–2 µm pores in quartz and feldspars than in the larger fraction but it is hard to establish a certain difference.
- Cracks in the µm range close to grain boundaries and larger fractures through grains were very similar to the larger fraction. The only difference is that biotite sheet separation was found for the larger but not the smaller fraction.

3.3.6 Final conclusions from the SEM study

All crushed samples show some alteration compared to the drill core samples. Regarding pores within crystals, the M sample minerals contained small amounts of pores in the 0.1–2 µm range. These were seemingly underrepresented in the smaller fraction but due to the inconsistency in the degree of polishing of these thin sections, no certain conclusion can be drawn. The difference in micro-fracturing is thus the most reliable observation to distinguish differences between the two crushing methods and between the different fractions. In this comparison the M sample 2–3 mm had higher amount of cracks close to the grain boundaries, more sheet separation of biotite along grain-boundaries and more fractures perpendicular to cleavage planes in the interior of biotite grains than the smaller M fraction and both of the HV fractions. The HV sample (both fractions) had more fractures through large grains, or grain aggregates, than in the M sample. The two HV fractions were similar to each other, although the smaller fraction had almost no sheet separation of biotite at grain-boundaries, in contrast to the larger fraction. The HV method seems to have resulted in similar crushing-related alteration features for the different fractions compared the M fractions, and has therefore produced a more homogeneous residue. The minerals of the M sample, at least the 2–3 mm, were more affected by the crushing than the HV samples, if longer fractures through mineral grains are excluded. The M method seems to have preferentially affected mineral grains close to grain-boundaries (increased fracturing), whereas the HV method to a larger extent fragmented grains at a larger scale, across whole grains and aggregates of grains. Furthermore, the M method seems to have affected the larger crystals more than the smaller ones, especially biotite, which showed more intense fracturing and alteration in the larger fraction.

3.4 Optical microscope

All fractions were examined using optical microscope, see Figure 3-43. The most evident difference between the two differently crushed rocks was the shape of the grains. The mechanically crushed grains were more angular than the grains crushed with high voltage that seemed more rounded. This was observed for the large fractions and even more so in the smaller fractions (0.25–0.50 and <0.25 mm) where many of the mechanically crushed grains had very sharp edges and rather elongated shapes. Most of these grains were observed to be feldspars, probably fragmented along their natural crystal lattice.

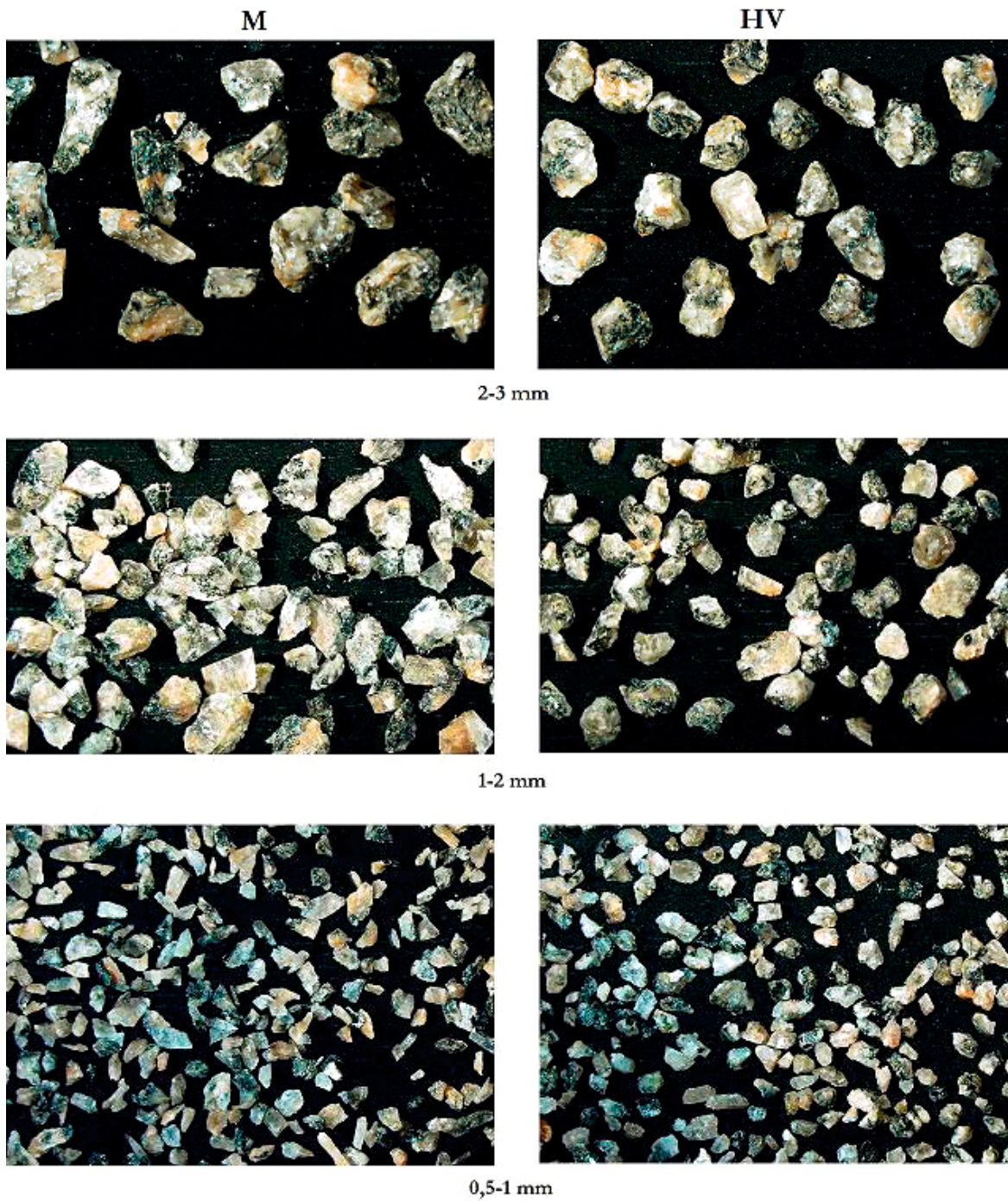


Figure 3-43. Example photos (both above and on the next page) of the different size fractions observed in the optical microscope (M to the left and HV to the right). The same magnification was used for both samples when comparing the size fractions. Width of photos is about 2 cm, except <0.25 mm, which is 2 mm wide.

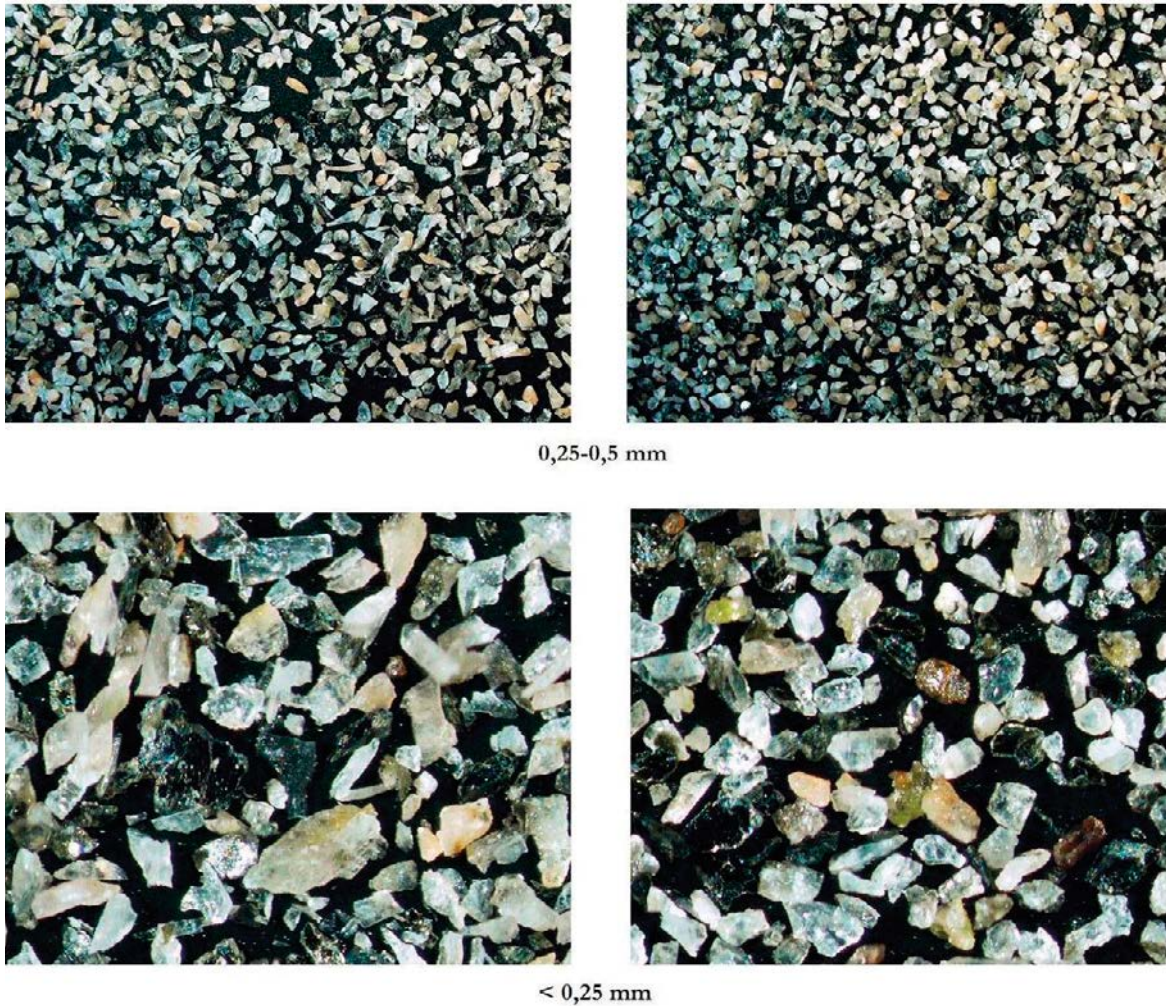


Figure 3-43. (Continued).

A large part of the M sample grains in the three smallest fractions were observed to be in the form of thin flat flakes. No such equivalent was found for the HV samples in the same size fractions. Another observation was that the size distribution seemed more even for the HV samples compared to the M samples for all fractions.

3.5 Reducing capacity

Measurements of the oxygen gas content in the flasks were carried out frequently during a period of 217 days to study the reducing capacity of the rock material (Figure 3-44 and Appendix A1.1). Because the starting concentration of O₂ differed somewhat in the six samples the results are presented as % change in O₂ (i.e. $(O_{2, \text{time T}}/O_{2, \text{start}}) - 1$), although it should be noted that this approach did not take into account any effect of the specific O₂-consumption rates resulting from different starting concentrations of O₂. The maximum positive change of the control samples were +5.1% and the negative change -5.9%. Changes within this range (marked with grey dotted lines in Figure 3-44) can thus not be considered to have happened due to oxygen consumption in the samples containing rock material.

Except for a couple of anomalously high or low values, the oxygen contents of the gas phase showed a steady decreasing trend for the flasks containing rock material.

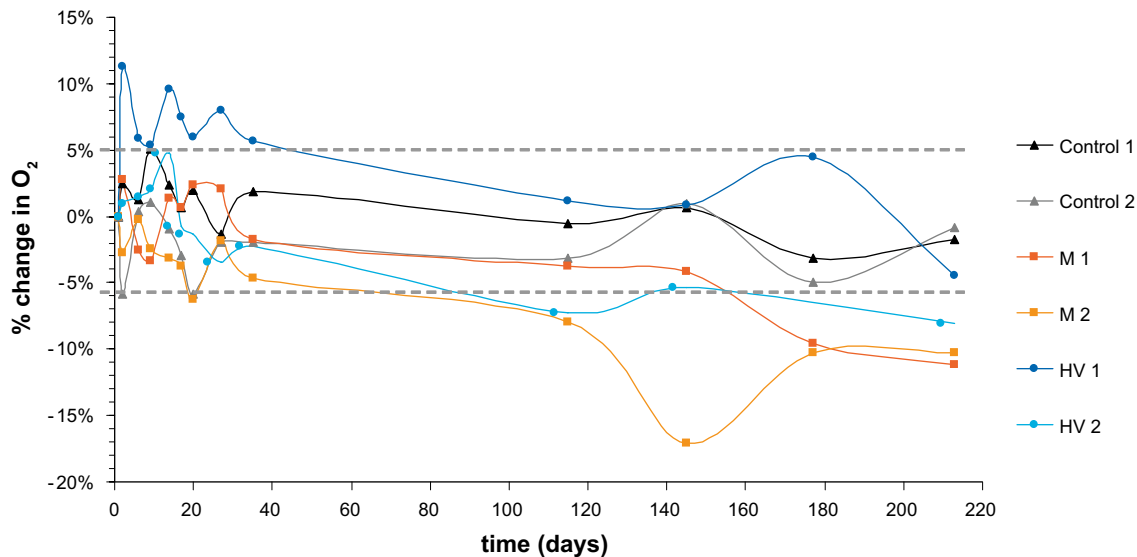


Figure 3-44. Change in oxygen gas concentration in relation to the starting value over the 217 days measurement period. The grey dotted lines show the maximum range where variations have been detected in the control samples.

The HV 1 sample showed a large increase in $[O_2]$ during the first 35 days of the experiment. For the remaining of the monitoring period, the HV 1 sample experienced a net decrease in oxygen concentration, but due to the initial increase, the final value is within the estimated error equal to that of the control samples. The HV 2 sample has a final value that can be considered to show a true decrease in oxygen concentration (-8% , somewhat below the precision of the blank samples).

The two M samples show a greater decrease in oxygen during the last period of the experiment and both samples have experienced a larger consumption of oxygen at the end of the study ($(10 \pm 5)\%$ and $(11 \pm 5)\%$) than the HV 2 sample, although within the estimated uncertainty of the method.

For the HV 2 sample a decrease of 8% in the oxygen content after 217 days would correspond to an oxygen consumption rate of about $1.5 \cdot 10^{-11}$ mol/(kg rock) (in total $2.8 \cdot 10^{-4}$ mol consumed O_2 per kg rock) for the HV sample, and for the M sample corresponding values would be $2 \cdot 10^{-11}$ mol/(kg rock) (in total $3.7 \cdot 10^{-4}$ mol consumed O_2 per kg rock) (based on the average O_2 decrease of the two samples). Using the BET data (see Table 3-3) this corresponds to $8.3 \cdot 10^{-14}$ mol/(m^2 s) and $9.4 \cdot 10^{-14}$ mol/(m^2 s) for the HV and M samples, respectively (total mol consumed O_2 per m^2 surface area being $1.56 \cdot 10^{-6}$ and $1.77 \cdot 10^{-6}$, respectively), i.e. slightly larger oxygen consumption per m^2 surface area for the M sample (although it should be noted that the differences in O_2 consumption between the samples were within the estimated $\pm 5\%$ uncertainty). Biotite makes up about 17 vol.% in the HV sample and 15.1 vol.% in the M sample, reported in the Appendix (Table A-12), and expecting similar densities for all minerals, the oxygen consumption rate is about $9 \cdot 10^{-11}$ mol/(kg-biotite s) for the HV sample and $1.4 \cdot 10^{-10}$ in the M sample (by dividing the oxygen consumption rate per kg rock with the portion of biotite in the rock).

Table 3-3 shows, as expected, general decreasing BET areas with increasing grain size for both the HV and the M samples, in accordance with André (2009). However, the HV 2–3 mm sample and the M 1.0–2.0 mm do not follow this trend. Due to the high BET surface area in the largest HV fraction, there is a large difference between the HV and M sample when comparing the difference of the largest and smallest fractions, which have smallest and largest surface area, respectively, in the M sample.

Table 3-3. BET area (m²/g) for the HV and M samples. Duplicate measurements were made for the 0.50–1.0 mm samples.

Size fraction (mm)	BET (m ² /g) for HV samples	BET (m ² /g) for M samples
0.25–0.50	0.2834	0.3369
0.50–1.0 (1)	0.2159	0.1964
0.50–1.0 (2)	0.2047	0.1949
1.0–2.0	0.1840	0.2167
2.0–3.0	0.2325	0.1390

3.6 Sorption capacity and weathering tendency

The study of the sorption capacity did not go as planned due to substantial release of strontium from the rock material. It was thought that by monitoring the weathering of Sr using blank samples with strontium-free synthetic groundwater these values could be deducted from the Sr concentration in the sorption samples. However, it turned out that the contribution of Sr from weathering was so large that it affected the entire sorption system. In this section actual concentrations in the solution and modified concentrations, where blank concentrations are subtracted, are presented. It should be noted that the modified concentrations probably do not fully account for the actual sorption mechanisms, as these are dependent on the concentration used in the experiment.

3.6.1 Distribution ratio, R_d

Adsorption

As can be seen in Figure 3-45, Sr(aq) only experienced the expected decrease in concentration initially, during the first seven hours. Thereafter, from the sampling performed 24 hours after the experiment start, the actual concentration increased due to the contribution from leaching. Even after deducting the [Sr] values from the blank samples it was obvious that the leached strontium had affected the entire sorption system to such an extent that concentrations were still increasing after 24 hours. Due to this, plots of the distribution ratio are not presented.

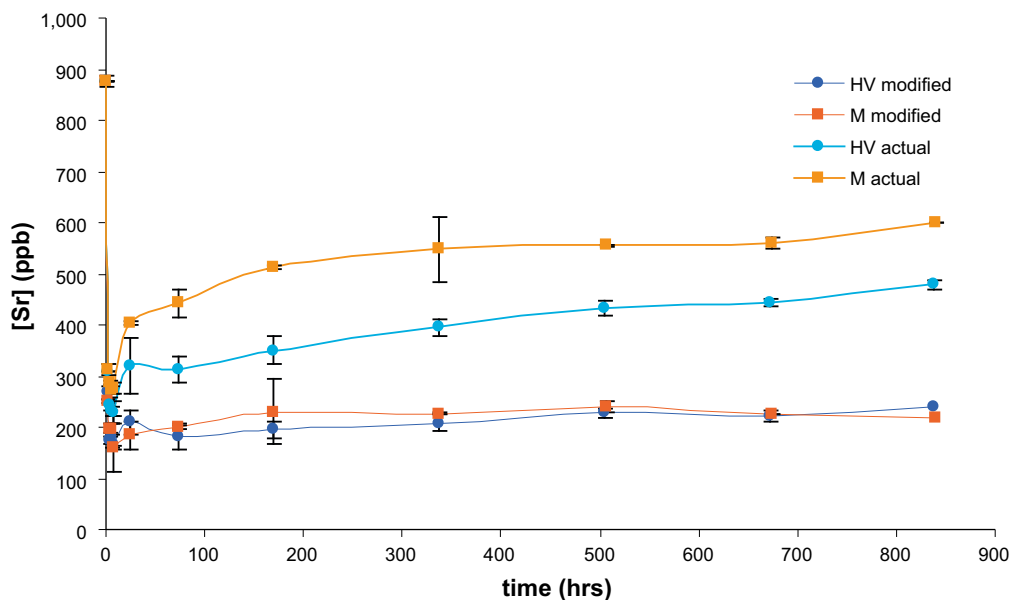


Figure 3-45. Strontium concentration in solution over time during the adsorption phase. The values from the blank samples have been deducted from the actual concentration for the samples named HV and M modified. All values are mean values from double samples. Error bars show the minimum and maximum values.

The initial rapid decrease in strontium concentration is most likely attributable to sorption on outer surfaces (Park and Hahn 1999). The modified concentrations for both samples show small differences during this initial time period but due to the dominating contribution of Sr from leaching for the remaining time period of the experiment it is hard to draw any conclusions regarding sorptive properties of the samples, and from the blank measurements (Figure 3-46) it is obvious that equilibrium is never achieved which further hinders useful interpretations. Furthermore, pH measurements indicate that the pH was not constant throughout the experiments, at least not within the first approximately 100 hours (Figure 3-50 and Figure 3-51), also indicative of disequilibrium. However, there is a significant difference in Sr concentration over time between the two samples, see Figure 3-45. The data shows that more strontium leached from the M sample, possibly due to relatively high fragmentation (indicatively larger surface area and/or higher reactivity of the surfaces) of Sr-bearing mica and plagioclase (probably also epidote). In the blank samples the concentration was higher in the M sample throughout the entire adsorption phase (Figure 3-46).

Desorption

During the desorption phase the initial plan was to perform a sequential extraction with synthetic groundwater (SWG), CaCl₂ (0.5 M) and KCl (0.5 M) to study the binding mechanism and potential differences in behaviour between the two differently crushed rock samples. However, due to contamination of Sr in the CaCl₂ solution only values from the desorption in SGW will be presented. The Sr concentrations during desorption in SGW are presented in Figure 3-47.

The actual [Sr] differed between the HV and M sample. However, after deducting the leached strontium (from the blank samples) there was no significant difference (Figure 3-47). The total desorbed amount was 87 ppm for HV and 85 ppm for the M sample. It is not possible to fully determine how much Sr that adsorbed to the rock due to leaching but based on the initial seven hours of the adsorption phase one can say that it was at least 708 ppm for the HV sample and 716 ppm for M. This means that about 12% of the initially adsorbed Sr has desorbed in SGW for both samples. This is consistent with earlier studies where 10% of adsorbed strontium desorbed in groundwater conditions (Park and Hahn 1999).

There was less difference between the blank samples compared to the adsorption phase but more Sr had leached from the M sample even if the difference was not significant at all times, see Figure 3-48.

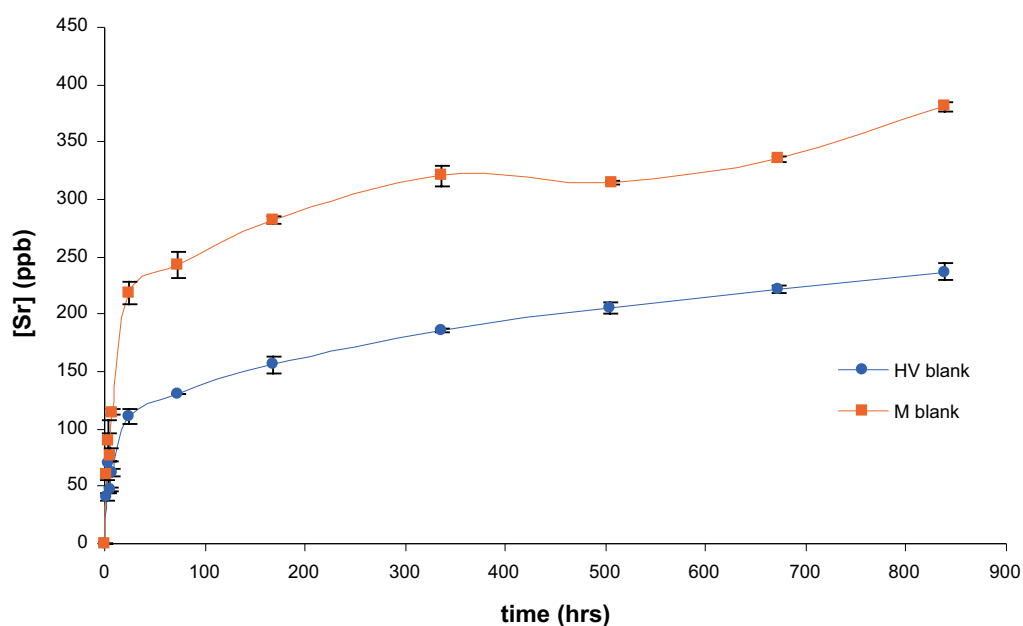


Figure 3-46. Mean concentrations of Sr in the blank samples during the adsorption phase. Error bars show the maximum and minimum values.

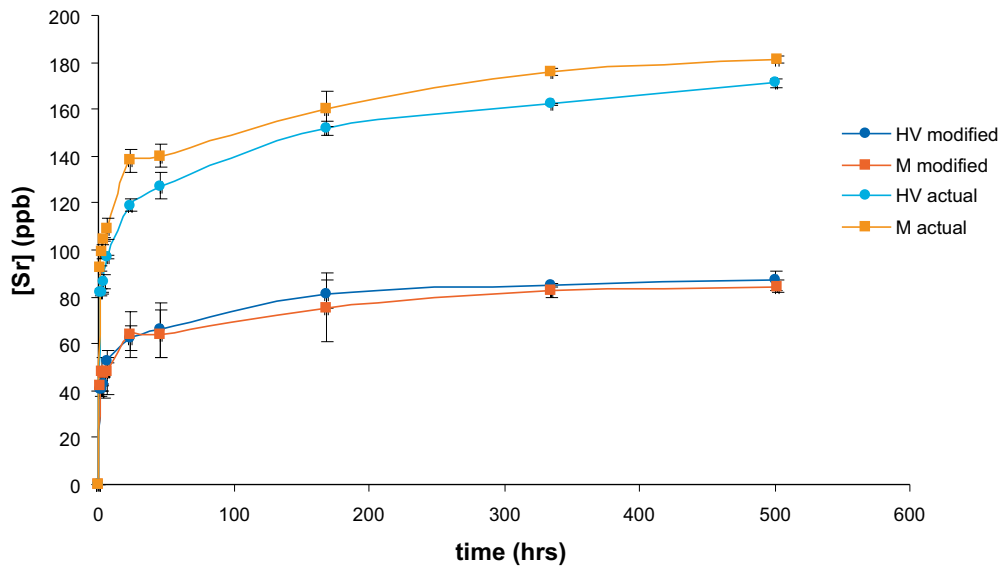


Figure 3-47. Concentration of strontium in the solution over time during desorption. The values from the blank samples have been deducted from the actual concentration for the samples named HV and M modified. All values are mean values of duplicate samples. Error bars show the minimum and maximum values measured.

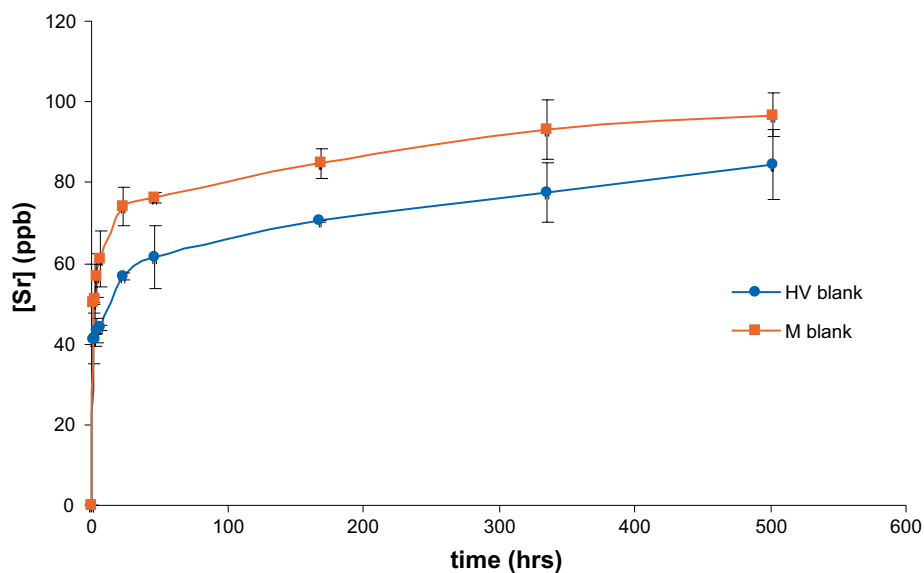


Figure 3-48. Mean concentrations of Sr in the blank samples during the desorption phase. Error bars show the maximum and minimum values. HV and M stand for high-voltage and mechanical crushing, respectively.

Because the concentrations increased with time as expected the distribution ratio, R_d , was plotted, see Figure 3-49. The data shows that there were no significant differences between the two samples during desorption. However, because leaching accounted for about half of all Sr released to solution (53% for M, 49% for HV) it is very likely that this contribution had a large effect on the sorption system and the R_d plot should therefore be interpreted with caution.

3.6.2 Isotherms

Figure 3-52 shows the percentage of the initial Sr that had adsorbed after 35 days and Figure 3-53 presents the percentage that has desorbed of the initially adsorbed strontium (corrected using a mean value of two blank measurements, which further increases the uncertainty of these samples, e.g. the M sample blank varied by >10%). The experimental time (35 days) was estimated to be sufficient from the results of the adsorption and desorption experiments described in the previous two sections.

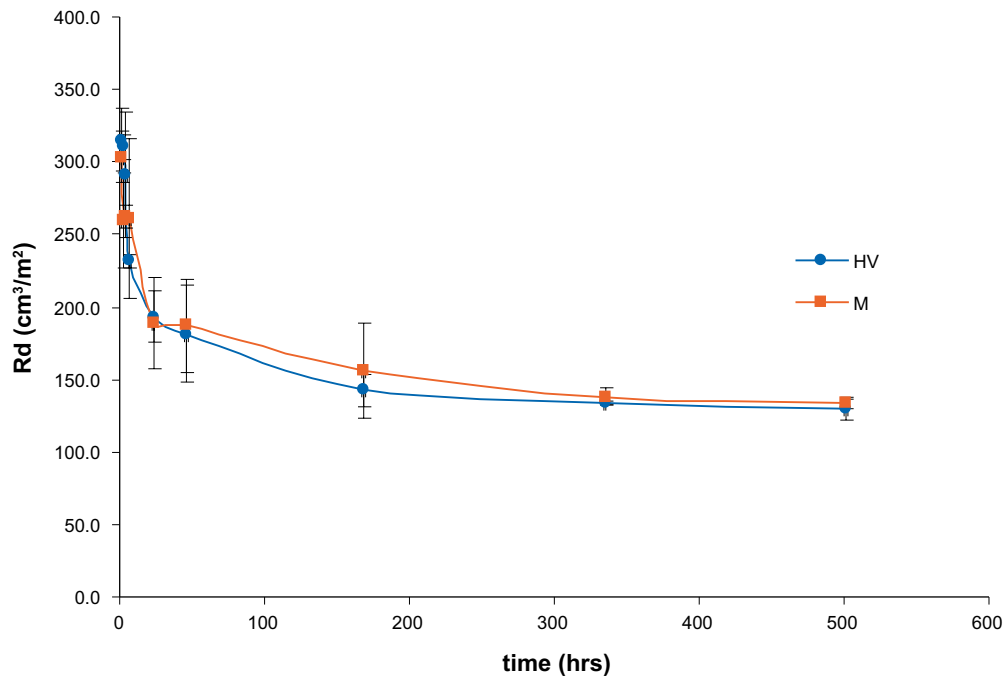


Figure 3-49. R_d values during the desorption phase. Error bars show the maximum and minimum values for the double samples.

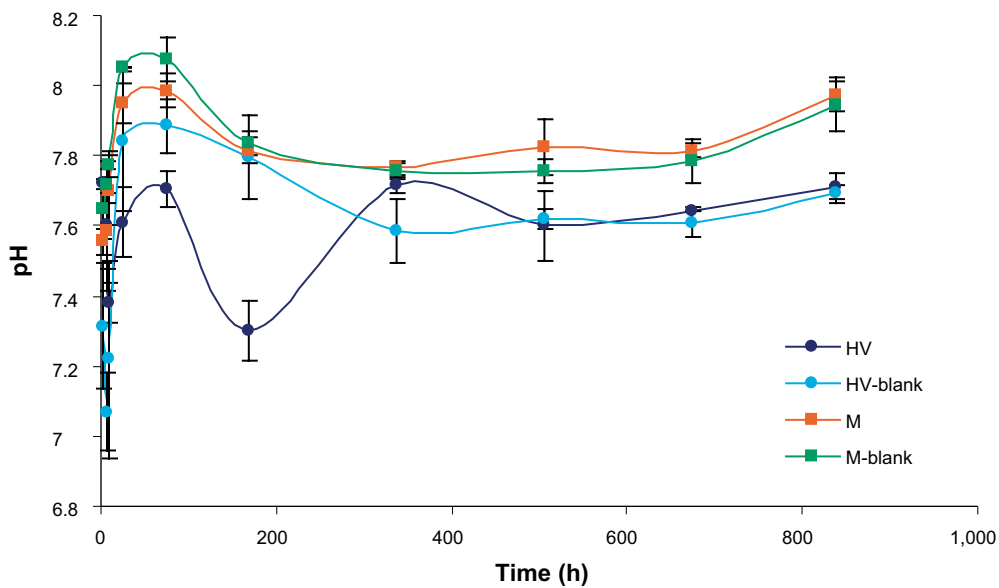


Figure 3-50. Average pH values ($n=2$) during the sorption experiment. Only values measured from 3 hours onwards are plotted; the initial pH values (8.2) have been excluded from the diagram. Error bars show the standard deviation for the double samples.

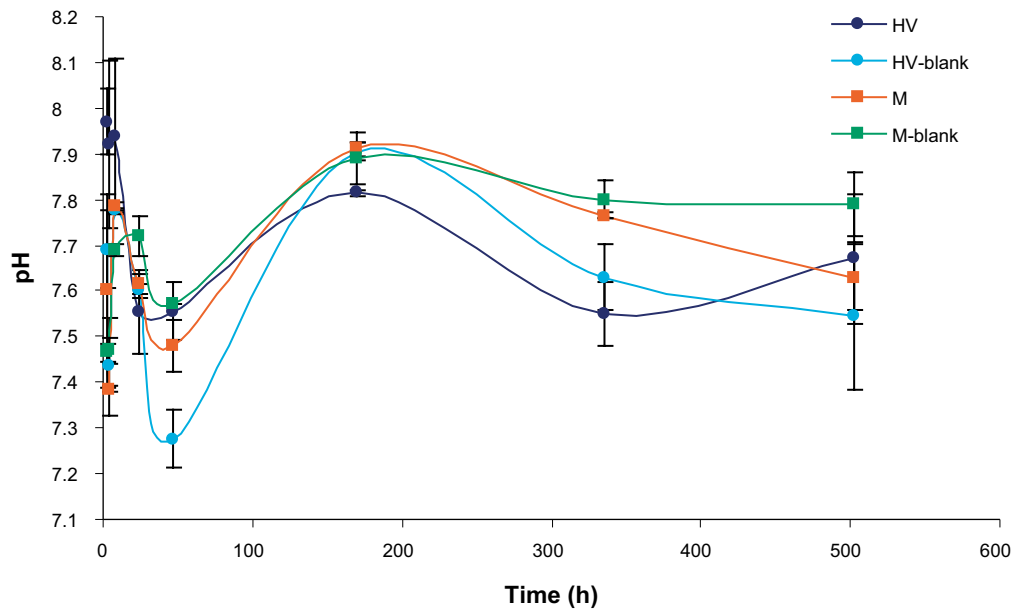


Figure 3-51. Average pH values ($n=2$) during the desorption experiment. Error bars show the standard deviation for the double samples.

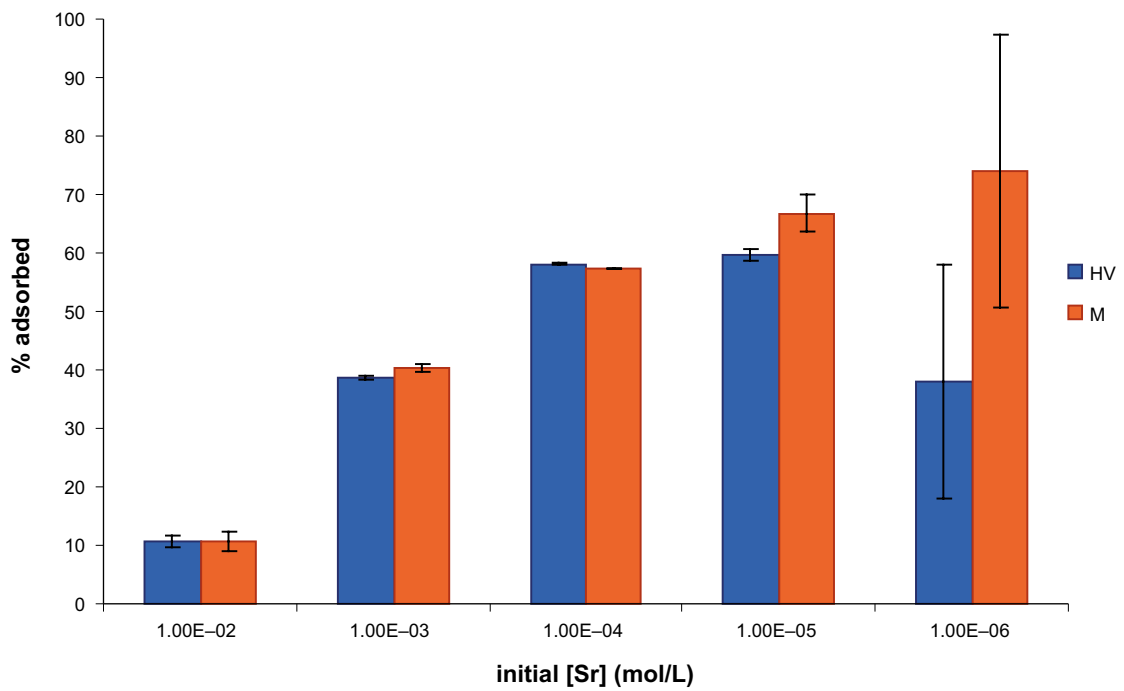


Figure 3-52. % adsorbed strontium of the initially added. Error bars show the minimum and maximum values of the duplicate samples.

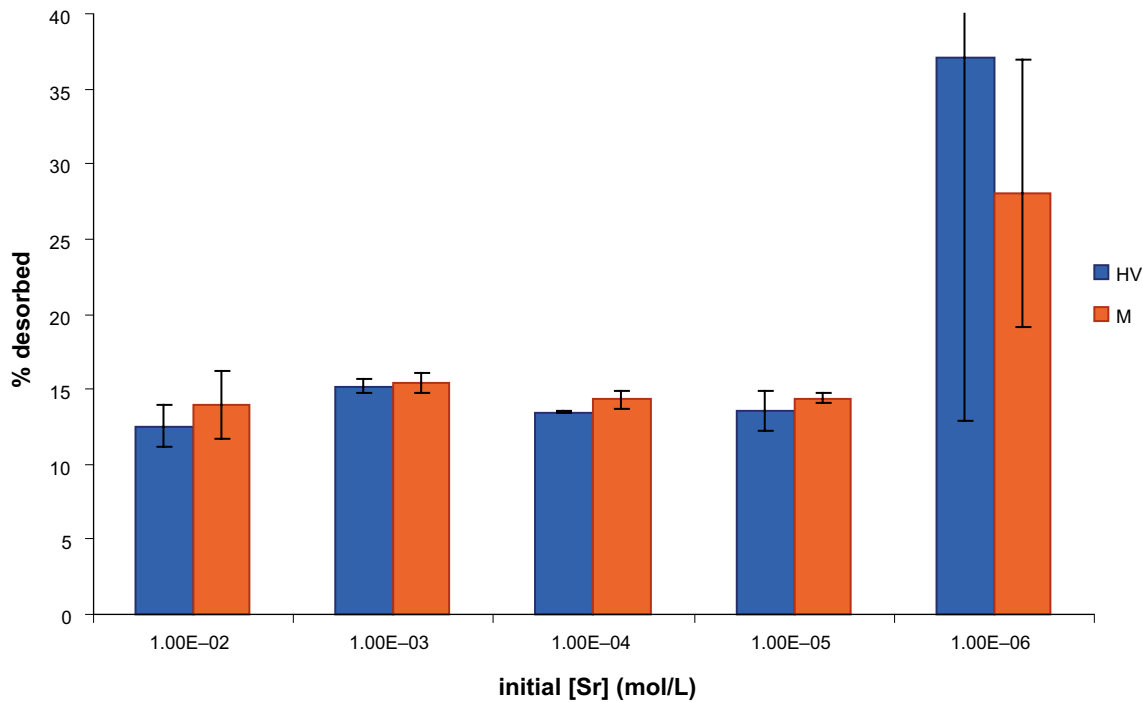


Figure 3-53. % desorbed strontium of the initially adsorbed. Error bars show the minimum and maximum values of the duplicate samples.

The samples prepared for the sorption isotherms were of course also affected by the leaching of strontium. Due to this large addition the two lowest concentrations have been removed when plotting the isotherms in Figure 3-54. Although there are large uncertainties, the percentage desorbed Sr was generally in the range of 13–15% for HV and 14–15% for M (Figure 3-53) which is not very far from the reported 10% that is expected to desorb in groundwater conditions (Park and Hahn 1999).

Sorption of strontium is commonly reported not to be dependent on strontium concentration. This gives rise to a linear isotherm which is expected for ion exchange. Because ion exchange has been found to be the major sorption process for strontium the data were plotted according to the linearised Freundlich equation:

$$\log q = n \cdot \log C + \log K \quad (\text{Equation 3-1})$$

where q is the sorption density, C the concentration of the sorbate in solution, K is the sorption density under standard conditions and n is a units-less constant describing the binding strength of the sorption sites (note the different n for sorption and desorption). The unit for q , C and K is mg/m^2 .

If the sorption is completely reversible then $n_{\text{desorption}}/n_{\text{adsorption}} = 1$ and $K_{\text{desorption}}/K_{\text{adsorption}} = 1$ and this was clearly not the case for the samples in this study, see Figure 3-54, Table 3-4 and Table 3-5 where data from the duplicate samples is presented. One cannot exclude the possibility that leaching also has affected the 10^{-4} M samples even if the leached amount only accounted for 5.3 and 6.6% for the HV and M samples respectively during adsorption. For the desorption phase the corresponding values were 8.7% (HV) and 10.2% (M). However, even if the 10^{-4} M samples would be removed from the isotherm graph the equations for adsorption and desorption would still differ. The most likely explanation is that pH differed in the adsorption and desorption solutions because the formation of SrCO_3 was avoided during adsorption only by adjusting to pH~6. The SGW used during desorption had a pH of approximately 8. pH impacts sorption processes through protonation or deprotonation of functional groups which affects the surface charge (Friedman et al. 1972). pH dropped to about 7.2 ± 0.1 during the adsorption phase and was 7.5 ± 0.1 at the end of the desorption phase, as measured after 35 days (A1.8 in Appendix 1). However, no significant difference between the two differently crushed samples can be found from the isotherm plot leading to the conclusion that, under this experimental set-up, there was no difference in the sorption capacity for the two samples.

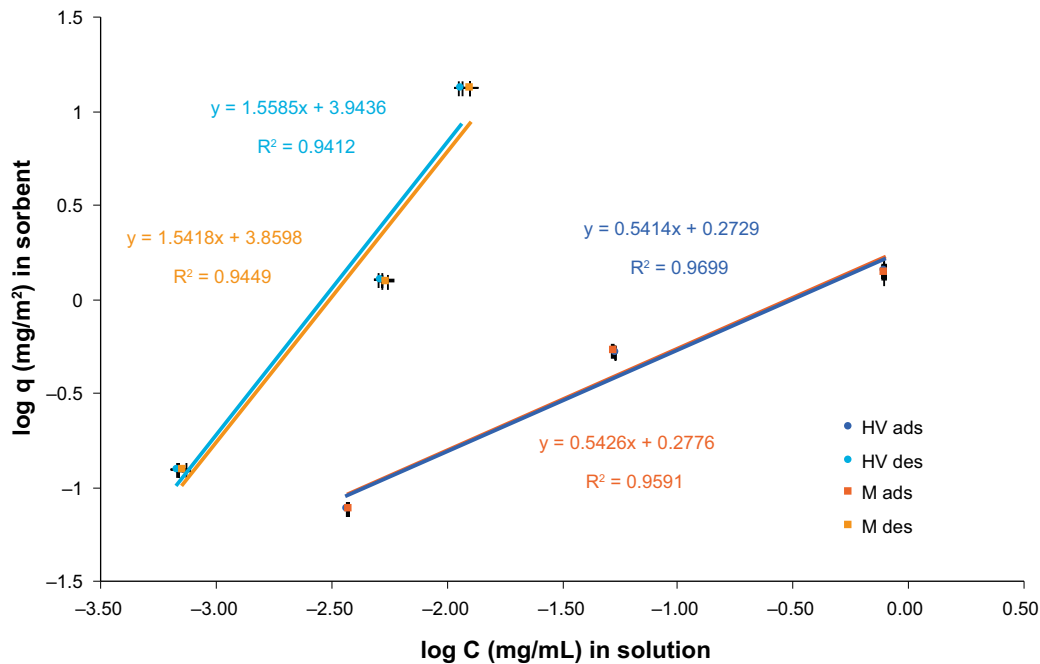


Figure 3-54. Freundlich isotherms for both adsorption and desorption. The data is mean values from the duplicate samples. The weathering contribution to [Sr] has been deducted using values from the blank samples. Only the data points corresponding to the initial Sr concentrations of 10^{-4} , 10^{-5} and 10^{-6} M are shown here.

Table 3-4. Values of K (intercept) and n (slope) from the isotherm plot for the HV double samples.

Sample	$n_{\text{adsorption}}$	$K_{\text{adsorption}}$	$n_{\text{desorption}}$	$K_{\text{desorption}}$	$n_{\text{des}}/n_{\text{ads}}$	$K_{\text{des}}/K_{\text{ads}}$
HV1	0.5245	0.2350	1.550	3.914	2.955	16.66
HV2	0.5583	0.3109	1.567	3.973	2.807	12.78
Mean	0.5414	0.273	1.559	3.944	2.881	14.72
±	0.0169	0.038	0.009	0.030	0.074	1.94

Table 3-5. Values of K (intercept) and n (slope) from the isotherm plot for the M double samples.

Sample	$n_{\text{adsorption}}$	$K_{\text{adsorption}}$	$n_{\text{desorption}}$	$K_{\text{desorption}}$	$n_{\text{des}}/n_{\text{ads}}$	$K_{\text{des}}/K_{\text{ads}}$
M1	0.5102	0.2087	1.563	3.893	3.064	18.65
M2	0.5752	0.3471	1.521	3.827	2.644	11.03
Mean	0.5427	0.2779	1.542	3.860	2.854	14.84
±	0.0325	0.0692	0.021	0.033	0.210	3.81

3.6.3 Iron, aluminium and magnesium

The concentration of the metals Al, Fe and Mg varied over time for all samples during both adsorption and desorption. The bottles containing the samples were shaken prior to each sampling to even out potential concentration gradients. At several occasions, small particles of biotite were detected in the solution after shaking and it is very likely that some of these particles were taken up along with the extracted samples and dissolved when the samples were acidified. This would explain the variation in concentrations and the strong correlation between the three metals because they would all originate mainly from biotite. Due to this probable strong influence from residual biotite, the results of adsorption and desorption are not presented in detail but only as raw data in the Appendix.

3.6.4 Conclusions

Due to the substantial release of strontium from the rock material the determination of the distribution ratio and isotherms did not go as planned. However, from the blank analyses it is indicated that more strontium has leached from the M samples. This implies that the mechanically crushed rock has a larger area of reactive surfaces or higher reactivity of the surfaces.

4 Summary and conclusions

Several of the sub-investigations presented in this report can be regarded as being of high scientific quality (SEM and microscope investigations coupled with analyses of chemical composition, as well as pore volume measurements; pore size distribution and surface area). In contrast, the investigations of sorption capacity and weathering tendency suffered from larger experimental problems and uncertainties and the implications of these results are thus more limited. In addition, the material used for the different methods (high-voltage and mechanical crushing) differed slightly in chemical and mineralogical composition, which probably has influenced the results to a variable, and generally unquantifiable, degree. The results of the mineralogical and pore size distribution can be summarized as follows:

- Studies with optical microscope showed that angular feldspar surfaces occurred more frequently in the M samples compared with the HV samples. The SEM investigations showed that all crushed samples had some alteration compared to the drill core samples. No certain conclusions regarding intra-crystalline pores could generally be drawn for the different materials and fractions due to inconsistency in the degree of thin section polishing. There were, however, distinguishable differences in the degree and characteristics of micro-fracturing. The minerals of the M sample, at least the 2–3 mm, were more affected by the crushing than the HV samples, if longer fractures through mineral grains are excluded. The M method seems to preferentially have affected mineral grains close to grain-boundaries (increased fracturing), whereas the HV method to a larger extent had fragmented grains at a larger scale, across whole grains and aggregates of grains. Furthermore, the M method seems to have affected the larger crystals more than the smaller ones, especially regarding biotite, which showed more intense fracturing and alteration in the larger fraction. The two HV fractions were generally more similar to each other than the M fractions.
- BET areas generally decreased with increasing grain size for both the HV and the M samples, although the HV 2–3 mm sample did not follow this trend. The pore size distribution curves show that in the range of 90 to 800 Å HV samples from all size fractions measured have larger quantities of pores compared to the M samples. This indicates either that the HV crushing has increased the amount of pores in this size range or that there were differences in pore occurrence in the original rock material. The PSD was quite similar between the larger size fractions while the smallest fraction measured, 0.25–0.50 mm showed a positive deviation for both crushing methods. For the HV samples the total surface area of pores >800 Å decreased with increased particle size while the surface area for smaller pores (15–800 Å) increased slightly. The M samples show a general decrease in both 15–800 Å and <800 Å pores from the 0.25–0.50 Å to the two larger fractions. The 2.0–3.0 mm fraction deviated for both HV and M samples, perhaps due to dominance of resistant K-feldspar phenocrysts. Because the surface area for both pore width groups differed for both samples between the grain sizes, alteration and/or selectivity is likely to have occurred during both crushing procedures.

Conclusions of the investigations of oxygen consumption and sorption capacity and weathering tendency are limited as stated above, but include:

- The 217 days long monitoring of oxygen consumption showed trends of decreasing concentrations for both rock samples. Although, indication of largest decrease for the mechanically crushed sample was observed (M: –11% compared to HV: –8%), it was within the estimated uncertainty $\pm 5\%$ of the method.
- The sorption experiment did not proceed as planned due to massive amounts of strontium leaching from the rock material which affected the entire sorption system. It was indicated that more strontium leached from the mechanically crushed rock, implying larger area of reactive surfaces or higher reactivity of the surfaces of this material.

In conclusion, the observed slightly greater oxygen consumption and angular feldspar surfaces indicate that mechanical crushing has created larger area of reactive surfaces or higher reactivity of the surfaces. None of the crushing methods have created grains that show similar pore size distributions over the entire spectra of grain sizes. This indicates that both crushing methods have led to alteration of the rock material making none of them representative for intact bedrock and, hence, none of the crushing methods have produced completely unaffected grains. Even so, SEM investigations showed

that the high voltage crushing has affected the crushed grains less than the mechanical crushing, and also produced grains that are more similar between different size fractions. Therefore, the general conclusion is that high voltage crushing method creates a material that is more representative for intact bedrock, although there are large uncertainties related to some of the methods and to the slight difference in the composition of the starting material.

5 Acknowledgements

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Reduction of oxygen

See Section 2.6 for a description of the experimental procedure, and Table 2-2 for a list of gas chromatographic parameters.

Table A1-1. Oxygen calibration data.

Oxygen (ppm)	Area
209,000	217,575.2
104,500	110,353.2
62,700	65,596.9
20,900	23,520.9
10,450	9,552.1
10,450	10,942.7
10,450	11,418.3
6,270	6,165.3
4,180	4,553.3
4,180	4,688.7
989	1,252.4
989	898.7
989	1,005

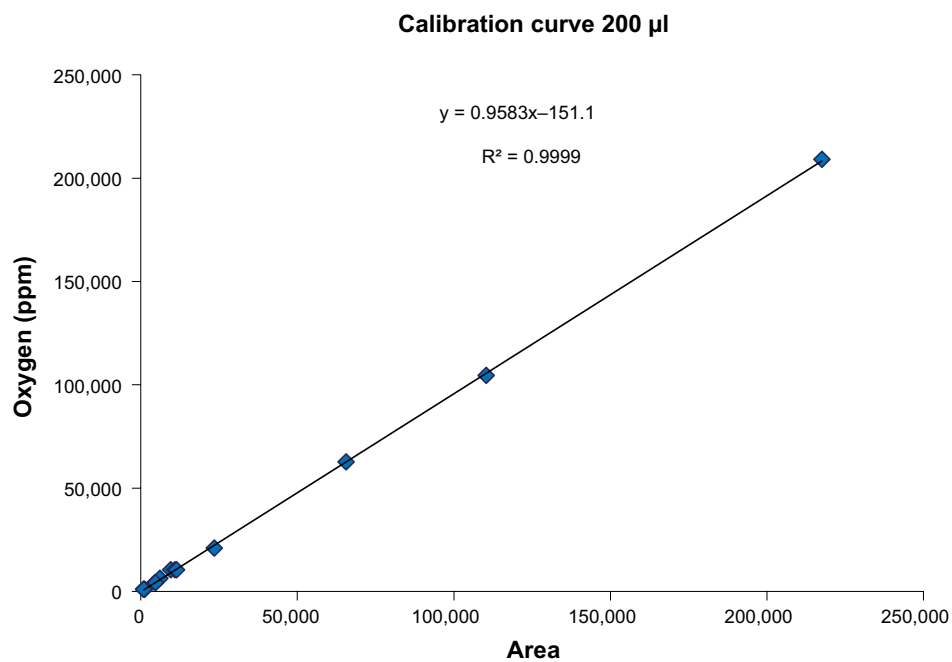


Figure A1-1. Calibration curve for oxygen.

Table A1-2. Argon areas for selected samples having an injection volume into the gas chromatograph of 200 μ L. Outliers and values for samples different than 200 μ L were not included in the average peak area calculation.

Flask	Argon areas for injection volume 200 μ L														Mean area	Std.dev.	
Control 1	833.8	843.7	723.1	809.8	735.5	805.6	772.7	731.8	730.6	799.1	816.3	766.7	830.5	719.2	784.6	43.46	
Control 2	836.8	829.7	945.3	849.5	868.3	843.5	906.3	850.8	813.2	934.5	945.8				874.9	49.07	
M 1	943.1	1,081.5	1,009.4	949.5	1,020.8	1,004.7	975.9	1,075.1	1,008.4	954.1	1,055.7				1,007.1	48.91	
M 2	858.7	857.9	954.3	947.8	869	904	899.9	904.6	932.9	1,012.1	998.7	892.1			919.3	51.06	
HV 1	860.4	788.2	952.9	1,051.9	868.6	1,057.1	889.7	935.9	895	900	1,084.4	947.2	1,015.8	964.8	1,047.6	950.6	86.27
HV 2	713.3	854.8	731.1	776.2	740	751.6	781.1	860.4	792.7	815.1	843.7	798.1	884.0			795.5	53.83

Table A1-3. Calculated oxygen concentration (in ppm) for the 217 day experiment period. Values are mean values from two samples.

Flask	Days after experiment start													
	1	2	6	9	14	17	20	27	35	115	145	177	217	
Control 1	12,963.1	13,278.6	13,125.9	13,623.0	13,268.9	13,050.6	13,215.8	12,791.3	13,206.9	12,898.4	13,053.5	12,555.9	12,741.7	
Control 2	14,989.3	14,114.7	15,046.9	15,155.5	14,842.1	14,543.4	14,107.3	14,692.5	14,698.0	14,511.7	15,130.1	14,248.7	14,869.3	
M 1	16,511.8	16,962.4	16,085.6	15,964.0	16,728.6	16,628.1	16,907.4	16,855.4	16,223.1	15,885.5	15,831.7	14,937.4	14,670.4	
M 2	15,428.6	15,002.4	15,384.4	15,048.2	14,936.5	14,853.5	14,465.2	15,137.4	14,713.5	14,191.9	12,786.3	13,837.2	13,849.2	
HV 1	14,723.6	16,385.8	15,590.0	15,510.3	16,134.7	15,824.9	15,598.9	15,899.4	15,553.4	14,897.4	14,843.6	15,378.2	14,064.4	
HV 2	12,971.7	13,101.6	13,165.9	13,241.3	13,589.5	12,872.1	12,799.1	12,517.8	12,678.9	12,029.6	12,275.6		11,927.6	

Table A1-4. Change in oxygen concentration (%). The values for the control flasks marked with gray background are the minimum and maximum change detected.

Flask	Days after experiment start												
	1	2	6	9	14	17	20	27	35	115	145	177	217
Control 1	0.0	2.4	1.3	5.1	2.4	0.7	1.9	-1.3	1.9	-0.5	0.7	-3.1	-1.7
Control 2	0.0	-5.8	0.4	1.1	-1.0	-3.0	-5.9	-2.0	-1.9	-3.2	0.9	-4.9	-0.8
M 1	0.0	2.7	-2.6	-3.3	1.3	0.7	2.4	2.1	-1.7	-3.8	-4.1	-9.5	-11.2
M 2	0.0	-2.8	-0.3	-2.5	-3.2	-3.7	-6.2	-1.9	-4.6	-8.0	-17.1	-10.3	-10.2
HV 1	0.0	11.3	5.9	5.3	9.6	7.5	5.9	8.0	5.6	1.2	0.8	4.4	-4.5
HV 2	0.0	1.0	1.5	2.1	4.8	-0.8	-1.3	-3.5	-2.3	-7.3	-5.4		-8.0

A1.1 Sorption and weathering

Table A1-5. pH over time for the R_d samples.

pH, adsorption experiments											
HV1	HV2	HVblank1	HVblank2	M1	M2	Mblank1	Mblank2	blank 1	blank 2	Time (h)	Time (days)
7.71	7.73	7.44	7.19	7.53	7.58	7.59	7.71	7.81	7.81	3.0	
7.73	7.47	7.15	6.99	7.51	7.66	7.75	7.68	7.79	7.73	6.0	
7.42	7.34	7.02	7.42	7.63	7.77	7.8	7.75	7.95	7.88	8.0	
7.68	7.54	7.7	7.98	7.91	7.99	8.05	8.05	8.08	7.81	25.8	1
7.67	7.74	7.83	7.94	7.95	8.02	8.03	8.12	8.08	7.90	74.2	3
7.36	7.24	7.71	7.88	7.79	7.84	7.86	7.81	8.05	7.86	169.2	7
7.70	7.73	7.65	7.52	7.75	7.78	7.74	7.77	8.05	7.97	337.7	14
7.67	7.53	7.60	7.64	7.77	7.88	7.78	7.73	8.05	8.00	505.9	21
7.64	7.64	7.58	7.64	7.8	7.83	7.74	7.83	8.06	8.00	673.4	28
7.68	7.74	7.68	7.71	7.94	8	7.89	8	8.19	8.02	838.9	35
pH, desorption experiments											
HV1	HV2	HVblank1	HVblank2	M1	M2	Mblank1	Mblank2	blank 1	blank 2	Time (h)	Time (days)
8.02	7.92	7.75	7.63	7.45	7.75	7.48	7.45	7.75	7.68	2.3	
8.05	7.79	7.51	7.36	7.39	7.38	7.45	7.49	7.74	7.58	4.4	
8.06	7.82	7.78	7.77	7.78	7.79	7.7	7.68	7.9	7.87	7.7	
7.62	7.49	7.59	7.61	7.6	7.63	7.69	7.75	7.77	7.72	23.7	1
7.6	7.51	7.32	7.23	7.44	7.52	7.57	7.57	7.8	7.78	47.1	2
7.81	7.82	7.92	7.89	7.9	7.92	7.85	7.93	8.07	8.05	169.3	7
7.60	7.50	7.58	7.68	7.76	7.77	7.77	7.83	8.01	8.00	335.6	14
7.57	7.77	7.43	7.66	7.58	7.68	7.74	7.84	8.06	8.01	502.1	21

Table A1-6. pH in solutions before experiment start.

[Sr] mol/L	initial pH
1.00E-02	6.01
1.00E-03	6.04
1.00E-04	5.99
1.00E-05	5.97
1.00E-06	6.02
Blank isotherm	6.23
Rd, 1E-5	8.21
Blank Rd	8.21

Table A1-7. Mass of samples.**Isotherm Mass of samples (g)**

sample	1.00E-06	1.00E-05	1.00E-04	1.00E-03	1.00E-02	blank
HV1	1.368	1.366	1.366	1.365	1.362	1.368
HV2	1.367	1.364	1.368	1.366	1.366	1.362
M1	1.498	1.497	1.497	1.504	1.503	1.498
M2	1.500	1.497	1.4 9	1.497	1.501	1.501

Rd Mass of samples (g)

HV1	HV2	HV blank	HV blank2	M1	M2	M blank1	M blank2
18.194	18.193	18.196	18.194	19.999	19.999	19.999	20.002

Table A1-8. pH in isotherm samples.

	pH, isotherm Sample	[Sr] (mol/L)						Time (days)
		1.00E-02	1.00E-03	1.00E-04	1.00E-05	1.00E-06	0	
Adsorption	HV 1	6.80	7.13	7.24	7.29	7.29	7.34	35
	HV 2	6.89	7.13	7.27	7.29	7.22	7.13	35
	M 1	7.06	7.21	7.30	7.39	7.32	7.24	35
	M 2	7.13	7.21	7.29	7.34	7.37	7.34	35
	blank (no rock)	7.09/7.01						35
Desorption	HV 1	7.61	7.56	7.58	7.59	7.51	7.42	35
	HV 2	7.57	7.56	7.53	7.59	7.44	7.32	35
	M 1	7.61	7.59	7.55	7.51	7.54	7.40	35
	M 2	7.56	7.53	7.54	7.51	7.54	7.30	35
	blank (no rock)	7.57/7.55						35

Table A1-9. Concentrations of Sr, Mg, Fe and Al in R_a samples during adsorption.

HV1					HV2				
time (hrs)	ppb (µg/L)				time (hrs)	ppb (µg/L)			
	Mg	Fe	Al	Sr		Mg	Fe	Al	Sr
1.27	796.95	942.71	735.19	308.26	1.27	1,254.11	1,667.28	1,151.59	309.15
3.67	649.28	688.93	561.00	257.58	3.68	723.42	818.85	608.33	231.60
5.69	1,708.02	2,294.19	1,466.00	239.51	5.67	924.17	1,054.87	754.95	222.34
7.72	3,664.35	5,391.34	3,268.57	208.14	7.70	13,861.58	20,625.75	13,396.69	252.63
25.34	52,712.33	78,952.64	44,290.50	375.02	25.32	15,190.83	22,391.55	12,729.08	266.61
73.54	31,716.93	46,727.83	26,335.09	336.96	73.48	17,438.39	25,395.39	14,558.81	286.80
168.67	33,649.91	48,267.19	27,537.57	376.96	168.67	22,929.52	33,202.00	19,132.12	323.86
337.02	35,401.66	49,960.01	28,027.05	410.45	337.03	26,743.02	38,097.90	21,125.29	379.91
505.30	49,338.22	69,789.14	38,895.45	448.90	505.30	29,016.94	40,879.04	22,733.52	417.57
672.80	41,589.18	57,676.01	32,431.18	451.19	672.82	33,242.13	46,316.80	25,853.75	435.09
838.45	53,983.75	75,660.81	42,198.57	488.50	838.47	41,230.49	56,822.80	32,148.78	468.14

HV blank1					HV blank2				
time (hrs)	ppb (µg/L)				time (hrs)	ppb (µg/L)			
	Mg	Fe	Al	Sr		Mg	Fe	Al	Sr
1.05	927.02	1,170.48	858.49	38.24	1.02	717.53	856.98	671.43	44.29
3.47	10,123.48	13,704.34	9,673.75	95.59	3.48	682.04	731.63	595.51	44.17
5.40	1,320.35	1,649.09	1,092.33	45.63	5.37	855.85	955.98	709.46	49.54
7.28	3,197.28	4,738.52	2,946.59	64.97	7.32	3,098.41	4,532.42	2,892.13	59.47
25.10	13,740.41	20,062.80	11,526.27	105.09	25.07	17,776.67	26,177.15	14,901.54	117.79
73.22	19,927.50	28,950.62	16,573.84	130.45	73.18	21,118.52	30,712.67	17,725.28	130.05
168.40	24,210.13	35,246.37	19,823.33	148.49	168.40	26,868.76	38,703.03	21,902.37	163.08
336.80	38,552.04	55,104.33	31,223.86	187.73	336.78	30,535.35	43,066.26	24,391.89	184.79
505.05	31,362.29	44,086.29	24,585.18	201.02	505.03	33,586.58	46,876.15	26,291.70	210.10
672.55	33,758.50	46,230.60	26,215.45	225.26	672.52	40,192.44	55,126.08	31,206.41	219.10
838.23	44,527.86	62,364.12	34,685.50	230.11	838.25	49,310.93	68,561.61	38,436.14	244.28

Table A1-9 (Continued).

M1 time (hrs)	ppb (µg/L)			
	Mg	Fe	Al	Sr
1.33	1,819.74	2,186.60	2,480.16	321.94
3.83	1,884.65	2,249.69	2,431.34	281.97
5.75	1,204.94	1,157.75	1,516.23	263.71
7.60	3,571.88	4,563.58	4,502.28	263.85
25.38	27,120.44	36,670.61	24,817.79	405.76
73.72	49,447.09	67,806.97	41,577.37	469.54
168.78	60,817.83	83,257.52	50,227.23	516.33
337.13	94,389.84	129,138.79	75,634.08	611.15
505.77	57,531.91	77,658.96	46,294.16	553.65
673.25	71,237.85	94,784.23	56,307.00	571.93
839.10	82,786.68	110,290.03	64,538.05	601.04

M2 time (hrs)	ppb (µg/L)			
	Mg	Fe	Al	Sr
1.33	1,037.39	1,009.77	1,378.71	302.95
3.85	5,474.15	7,491.72	5,626.52	291.12
5.73	2,821.51	3,522.00	3,374.26	281.64
7.58	5,851.97	7,963.32	6,643.84	286.37
25.38	29,509.28	41,053.08	26,516.35	399.45
73.70	38,648.97	52,833.99	32,677.08	415.28
168.78	60,652.55	86,639.49	50,439.48	507.64
337.13	38,211.56	53,282.18	31,051.02	484.86
505.77	70,293.02	98,807.81	56,339.90	557.92
673.25	69,851.64	100,097.79	55,211.00	549.39
839.12	85,701.01	121,710.06	66,854.32	600.88

M blank1 time (hrs)	ppb (µg/L)			
	Mg	Fe	Al	Sr
1.08	1,526.96	1,765.36	1,794.46	65.33
3.60	1,663.27	1,970.04	1,851.54	71.31
5.50	1,373.53	1,469.58	1,549.13	71.37
7.35	5,765.86	7,797.10	6,585.23	117.21
25.17	26,031.96	35,288.17	23,191.87	209.30
73.43	50,459.02	69,132.81	41,582.75	254.35
168.55	51,762.35	70,031.48	42,327.93	284.55
335.88	76,564.17	105,640.16	60,788.50	330.16
505.52	59,723.42	83,056.38	47,390.48	315.82
673.02	69,448.45	95,562.87	54,370.48	337.32
839.02	96,052.17	131,011.32	74,365.85	377.31

M blank2 time (hrs)	ppb (µg/L)			
	Mg	Fe	Al	Sr
1.10	914.80	925.70	1,125.35	56.09
3.60	3,207.59	4,170.55	4,565.65	107.21
5.50	2,968.59	3,673.26	3,184.10	83.50
7.35	6,111.06	8,384.74	6,551.51	112.30
25.18	38,326.31	52,240.20	32,228.24	227.80
73.43	43,230.28	59,019.09	35,445.30	231.46
168.60	49,725.33	66,796.84	40,013.65	279.04
335.90	66,774.51	90,556.03	52,984.64	311.94
505.55	57,069.51	77,829.16	45,153.92	312.89
673.03	73,393.57	99,241.15	57,110.88	333.31
839.15	114,852.81	156,942.35	88,220.45	385.17

Table A1-10. Concentrations of Sr, Mg, Fe and Al in R_d samples during desorption.

HV1 time (hrs)	ppb (µg/L)				HV2 time (hrs)	ppb (µg/L)			
	Mg	Fe	Al	Sr		Mg	Fe	Al	Sr
1.12	2,412.18	3,466.23	2,270.39	83.18	1.10	2,486.95	3,538.69	2,331.84	80.51
2.00	2,740.34	3,885.02	2,562.84	82.26	2.00	2,429.91	3,488.66	2,298.88	81.18
4.02	4,399.20	6,607.28	4,112.22	89.45	4.03	2,790.66	4,048.24	2,623.03	83.33
7.02	3,257.53	5,213.86	3,065.97	97.49	7.03	2,640.77	3,746.92	2,460.80	96.43
23.23	5,681.46	8,378.46	5,338.77	121.72	23.25	4,855.51	7,049.34	4,439.67	116.43
46.23	4,976.77	7,259.80	4,625.39	133.06	46.25	4,866.74	7,097.41	4,492.83	121.65
168.32	5,952.82	8,697.70	5,464.34	148.56	168.32	5,518.52	7,998.67	5,005.50	154.53
335.13	6,607.84	9,613.21	5,993.61	162.01	335.15	6,424.09	9,375.45	5,792.11	162.68
501.27	7,989.49	11,654.07	7,279.77	169.09	501.28	7,381.34	10,823.89	6,661.63	173.31

HV blank1 time (hrs)	ppb (µg/L)				HV blank2 time (hrs)	ppb (µg/L)			
	Mg	Fe	Al	Sr		Mg	Fe	Al	Sr
1.10	2,583.98	3,719.44	2,416.05	38.16	1.12	3,294.46	4,800.46	3,073.15	44.44
1.98	2,596.37	3,678.66	2,428.43	41.80	1.97	3,423.50	4,990.98	3,201.72	40.16
4.03	3,644.79	5,314.77	3,420.21	41.78	4.07	3,836.12	5,577.75	3,575.59	44.69
7.05	2,871.10	4,084.61	2,689.10	43.75	7.08	3,112.62	4,433.87	2,904.04	44.33
23.27	4,360.10	6,330.83	4,075.83	56.38	23.28	5,497.10	7,995.81	5,121.53	57.29
46.27	4,813.57	7,065.45	4,459.67	65.40	46.28	5,399.70	7,895.20	4,993.67	57.63
168.32	5,575.33	8,165.86	5,102.33	70.51	168.38	6,907.47	10,182.67	6,406.22	70.41
335.20	5,993.11	8,641.30	5,386.94	73.89	335.22	7,592.63	11,123.81	6,980.97	81.26
501.30	7,267.61	10,749.23	6,617.50	88.68	501.37	8,435.83	12,613.95	7,706.19	79.99

Table A1-10 (Continued).

M1 time (hrs)	ppb (µg/L)			
	Mg	Fe	Al	Sr
1.12	4,305.59	5,966.13	3,905.54	91.02
2.10	5,457.03	7,682.42	4,969.37	102.28
4.15	5,182.67	7,124.88	4,666.30	104.98
7.08	4,408.80	6,035.32	3,992.90	104.15
23.30	7,267.04	10,223.93	6,514.14	133.14
46.30	5,645.52	7,660.64	4,948.75	135.18
168.53	5,966.46	8,075.25	5,122.17	152.86
335.30	9,498.11	13,204.81	8,230.85	174.33
501.95	8,739.81	12,237.57	7,618.52	180.05

M2 time (hrs)	ppb (µg/L)			
	Mg	Fe	Al	Sr
1.10	4,749.95	6,660.49	4,306.77	93.34
2.10	5,426.31	7,654.11	4,894.32	96.46
4.18	5,284.70	7,469.41	4,787.16	103.68
7.08	6,814.98	9,674.35	6,196.24	113.74
23.30	9,908.91	14,314.76	8,907.51	142.96
46.30	7,941.78	11,237.99	7,065.74	145.24
168.53	7,140.27	9,966.45	6,294.17	167.34
335.28	7,482.56	10,417.00	6,496.54	177.45
501.97	7,292.23	10,234.37	6,244.29	182.37

M blank1 time (hrs)	ppb (µg/L)			
	Mg	Fe	Al	Sr
1.08	5,184.14	7,399.12	4,730.09	50.26
2.08	5,155.92	7,182.25	4,613.53	55.31
4.20	3,852.85	5,256.53	3,454.94	59.58
7.07	4,307.06	5,946.88	3,859.35	57.67
23.30	6,240.31	8,662.01	5,561.69	71.70
46.28	5,265.35	7,175.12	4,648.30	75.55
168.52	8,879.87	12,395.15	7,795.57	86.65
335.25	9,059.00	12,680.35	7,812.80	96.89
501.93	8,529.63	11,870.87	7,365.40	99.36

M blank2 time (hrs)	ppb (µg/L)			
	Mg	Fe	Al	Sr
1.10	4,655.27	6,469.26	4,221.97	50.09
2.13	4,155.74	5,753.56	3,789.69	46.61
4.23	5,838.55	8,163.89	5,197.94	54.20
7.10	7,153.62	10,197.44	6,477.89	64.71
23.32	6,866.67	9,649.13	6,186.49	76.60
46.32	10,463.33	14,773.47	9,164.00	76.84
168.52	9,074.78	12,792.54	7,974.06	82.80
335.27	9,591.58	13,406.08	8,415.76	89.46
501.95	10,268.61	14,649.61	8,960.86	93.92

Table A1-11. Concentrations of Mg, Fe, Al and Sr in isotherm samples during adsorption (left) and desorption (right).

Adsorption phase, isotherm samples. Conc. in ppb.					Desorption phase, isotherm samples. Conc. in ppb.				
Sample	Mg	Fe	Al	Sr	Sample	Mg	Fe	Al	Sr
HV10-2 1	5,034.01	5,118.22	3,095.37	791,725.69	M10-2 1	842.37	1,207.70	857.73	12,661.96
HV10-2 2	3,583.67	3,117.66	1,896.17	774,931.15	M10-2 2	627.29	890.10	678.82	12,695.72
HV10-3 1	3,380.26	3,218.59	1,929.17	54,323.93	HV10-2 1	235.57	349.61	306.55	11,801.32
HV10-3 2	3,512.32	3,366.06	1,998.75	53,560.72	HV10-2 2	297.11	461.39	378.65	11,428.66
HV10-4 1	4,117.13	4,618.05	2,671.59	3,887.51	M10-3 1	1,200.37	1,555.17	1,120.54	5,664.77
HV10-4 2	3,642.64	3,934.37	2,374.51	3,859.39	M10-3 2	642.19	783.43	621.53	5,348.50
HV10-5 1	2,255.97	1,722.19	1,197.40	549.49	HV10-3 1	362.57	447.26	371.92	5,299.35
HV10-5 2	2,374.25	1,895.67	1,136.86	567.24	HV10-3 2	295.15	338.78	306.80	5,110.77
HV10-6 1	2,857.27	2,856.08	1,729.48	242.02	M10-4 1	728.73	790.02	623.44	831.48
HV10-6 2	3,575.49	3,878.41	2,271.60	277.10	M10-4 2	353.69	292.18	292.29	767.02
HVblank 1	3,353.77	3,778.33	2,268.31	197.39	HV10-4 1	357.35	341.26	308.01	751.93
HVblank 2	2,542.87	2,259.34	1,370.75	213.08	HV10-4 2	356.69	343.61	311.56	747.18
blank1	7.92	9.89	89.97	865,389.41	M10-5 1	1,175.52	1,425.41	1,039.92	168.01
blank2	8.90	9.32	90.70	884,951.96	M10-5 2	1,317.34	1,673.12	1,227.02	163.61
M10-2 1	19,938.16	23,655.70	16,334.63	798,385.32	HV10-5 1	492.35	576.87	452.81	130.30
M10-2 2	18,229.00	21,204.20	14,532.96	768,696.46	HV10-5 2	290.68	199.65	214.64	141.86
M10-3 1	6,359.78	7,155.74	5,683.22	53,025.40	M10-6 1	518.53	507.66	432.36	98.15
M10-3 2	6,885.76	7,751.17	5,757.84	52,036.38	M10-6 2	770.37	902.12	688.27	95.20
M10-4 1	9,511.36	11,963.86	8,424.74	4,011.11	HV10-6 1	368.67	368.98	325.73	71.82
M10-4 2	5,625.18	6,403.35	4,907.57	4,014.04	HV10-6 2	289.28	227.14	241.40	74.86
M10-5 1	5,412.59	6,343.08	4,666.78	529.71	HVblank 1	659.17	714.91	558.88	77.49
M10-5 2	4,231.70	4,338.55	3,040.61	586.45	HVblank 2	972.27	1,180.93	853.95	86.07
M10-6 1	3,807.83	3,968.99	2,778.55	269.03	HVblank 1	300.79	256.26	264.49	65.10
M10-6 2	3,623.46	3,445.78	2,425.92	310.02	HVblank 2	429.32	448.74	378.53	65.39
HVblank 1	6,576.53	7,334.92	5,380.24	298.74	blank1	5.45	12.98	41.41	38.76
HVblank 2	4,096.70	4,347.75	3,132.77	234.85	blank2	4.49	10.31	36.14	58.53

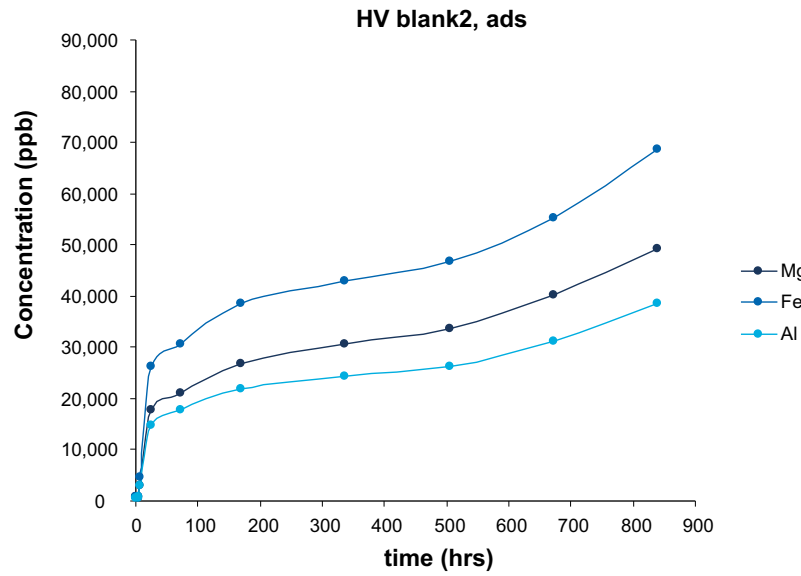
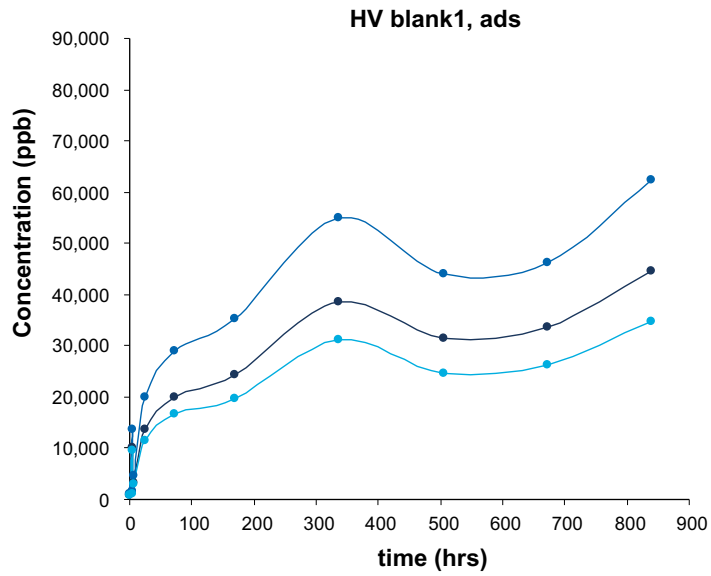
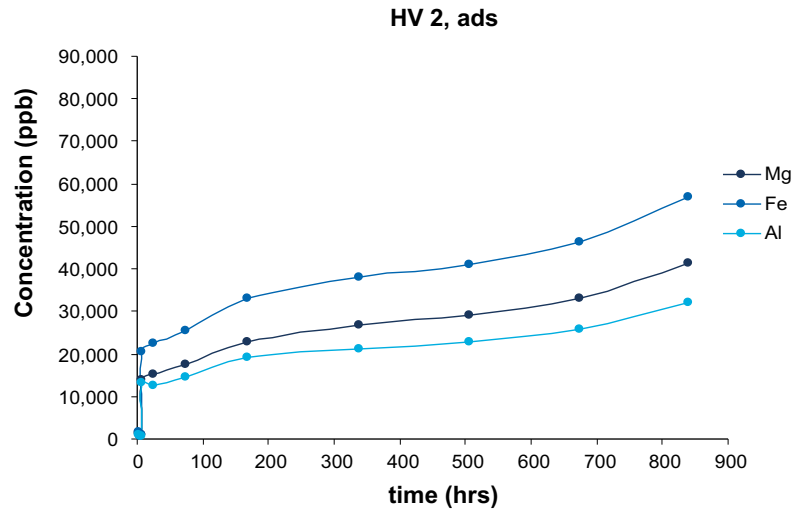
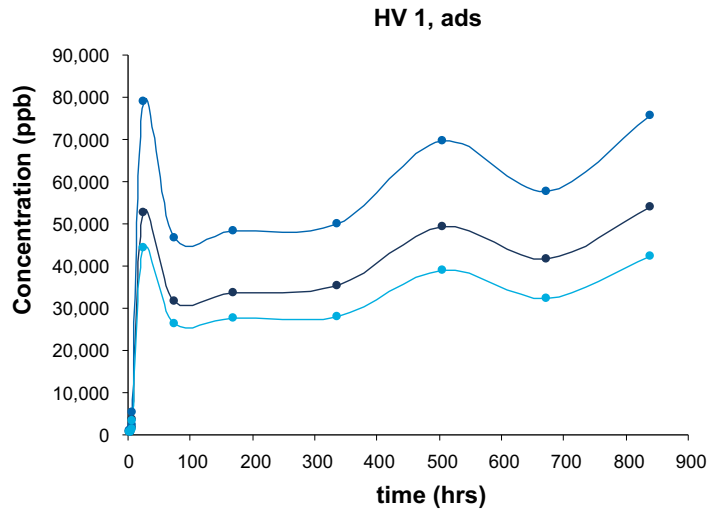


Figure A1-2. Plots of Fe, Al and Mg over time.

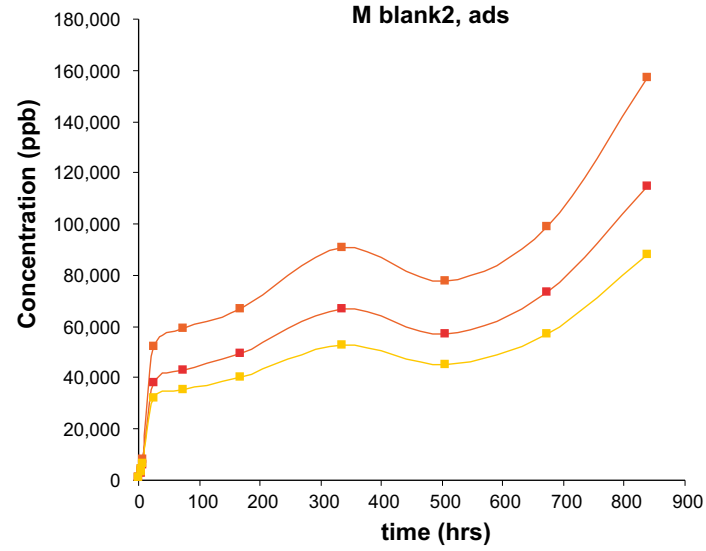
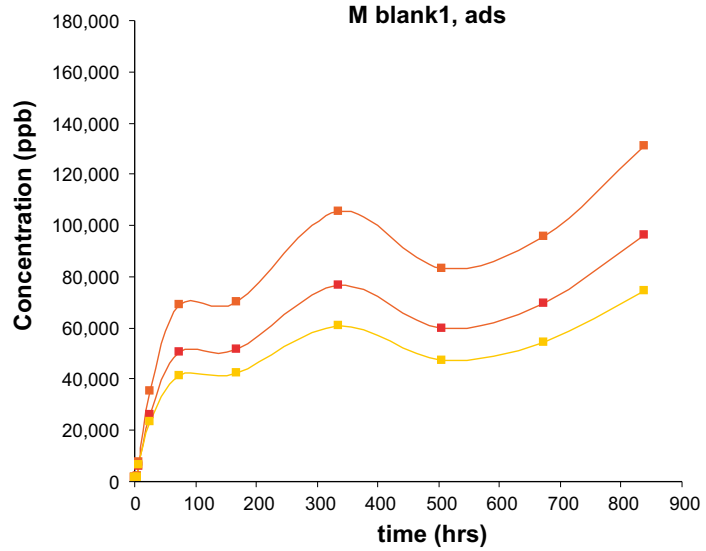
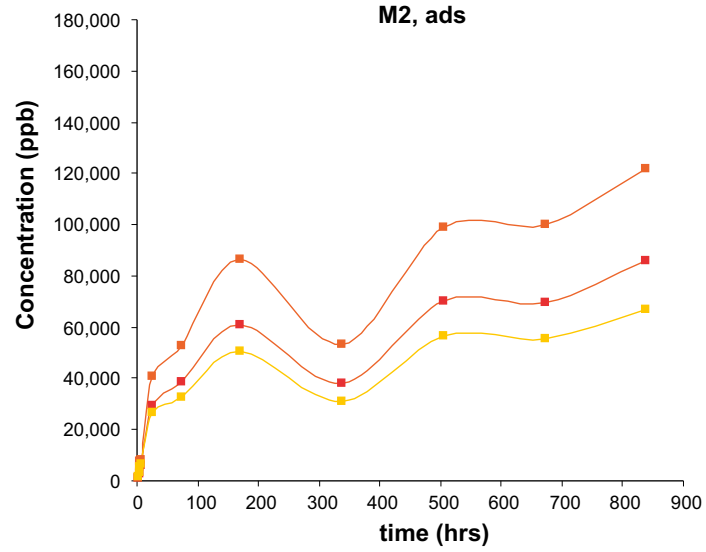
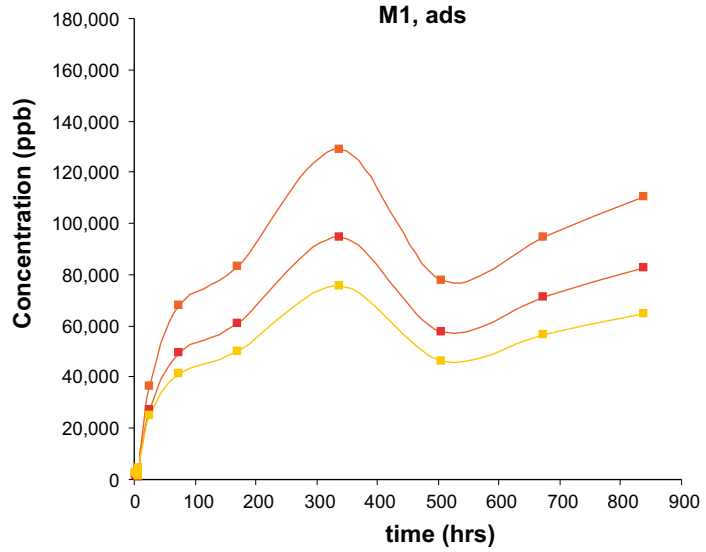


Figure A1-2. (Continued).

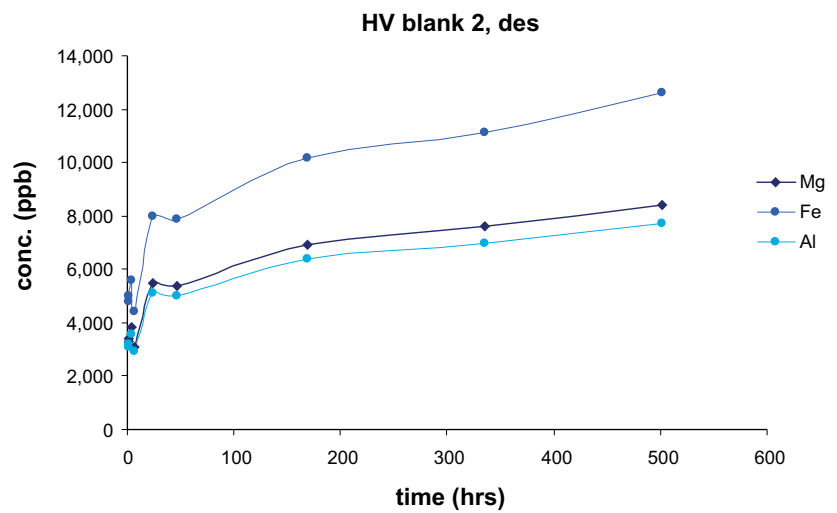
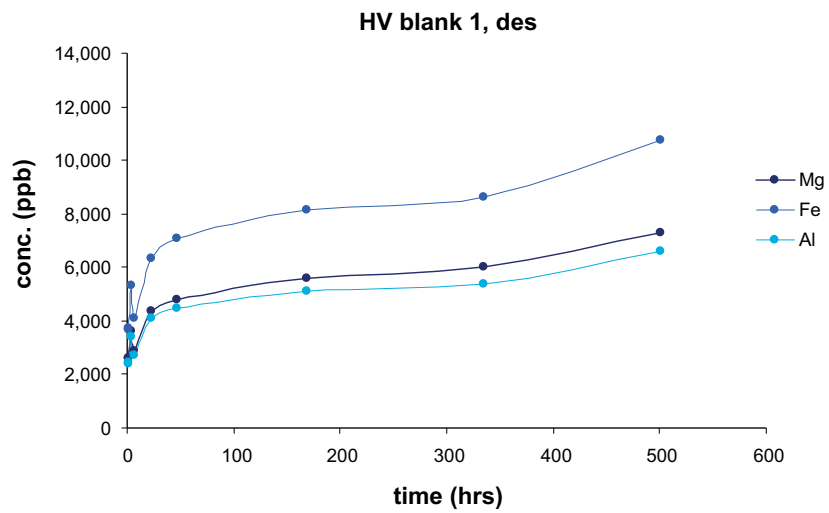
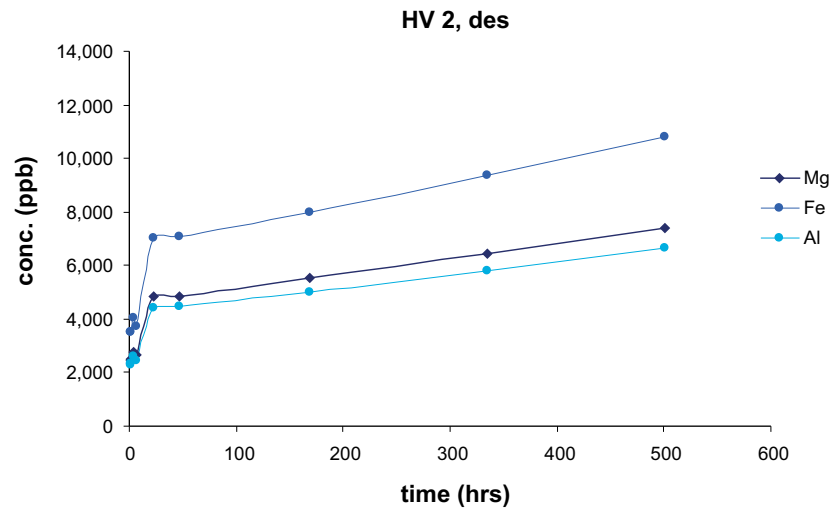
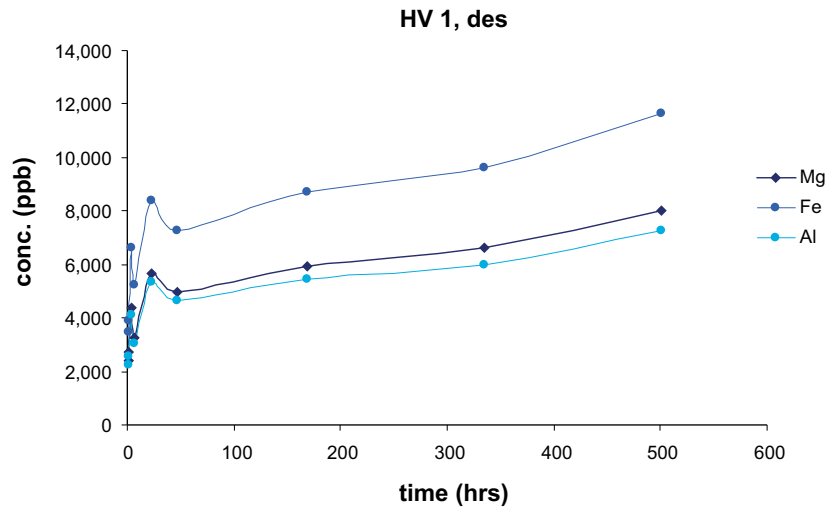


Figure A1-2. (Continued).

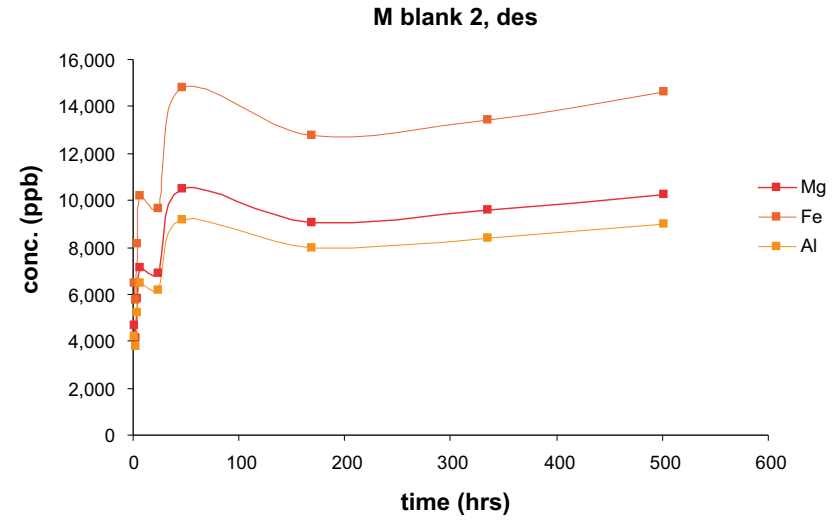
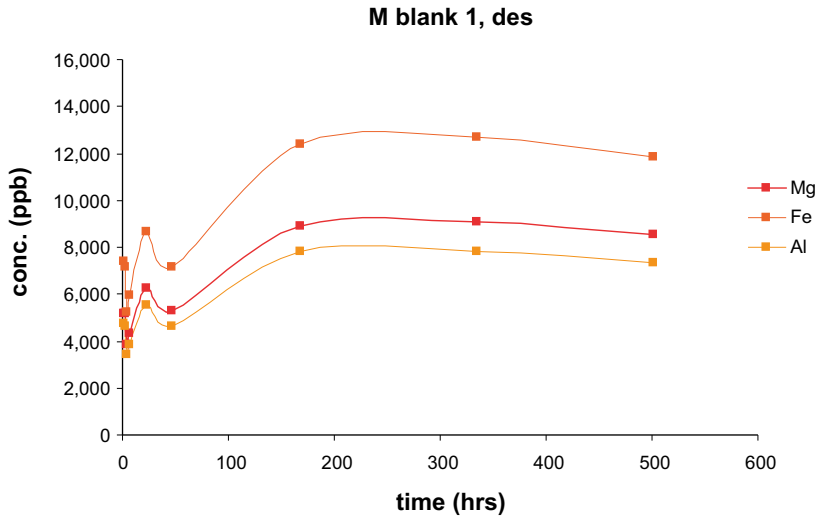
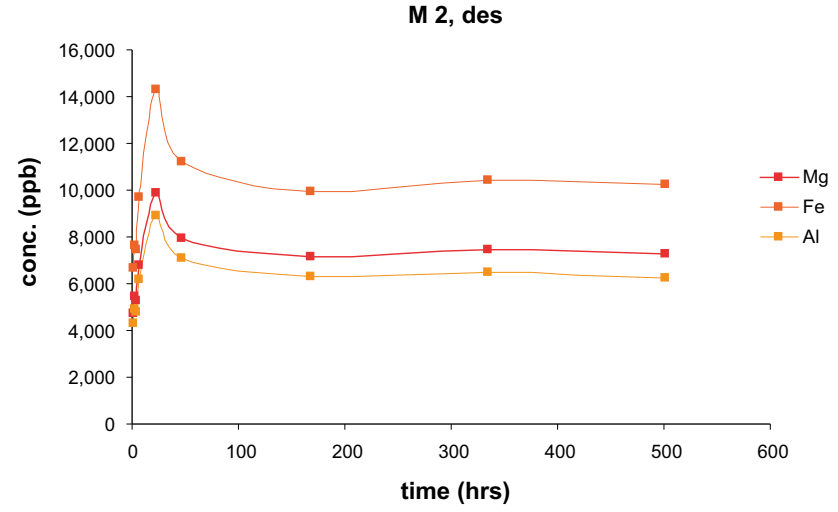
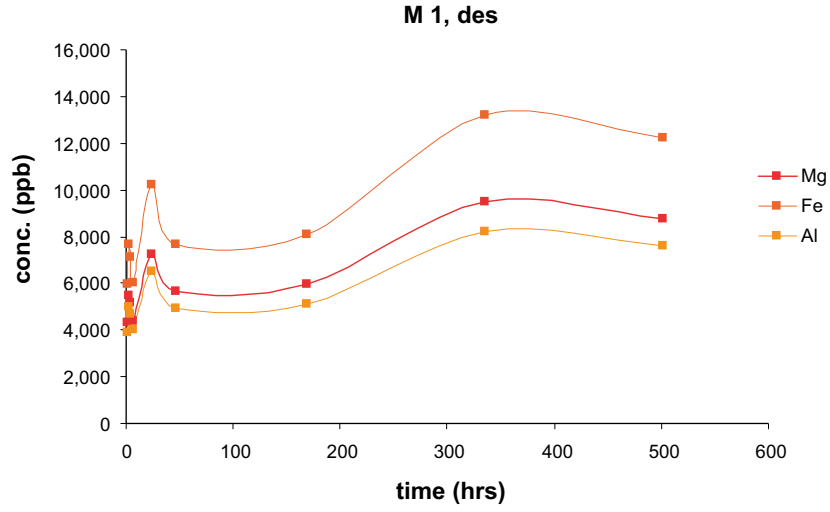


Figure A1-2. (Continued).

A1.2 Mineral compositions

Table A1-12. Determination of mineral composition by point counting using thin sections of drill core samples and classification of rock type. Points that were counted as “not valid” were in grain boundaries and not included in the % distribution between minerals. Points where the mineral could not be identified (marked “unknown”) were included in all calculations. Primes (in the lower table) are calculated as in the following example: $Q' = 100 \cdot Q / (Q + P + A + F)$.

Point counting from thin sections					% distribution						
Mineral	M 1	M 2	HV 1	HV 2	Mineral	M1	M2	M mean	HV1	HV2	HV mean
Plagioclase	296	264	258	233	Plagioclase	59.2	52.8	56.0	51.6	46.6	49.1
Quartz	74	78	52	39	Quartz	14.8	15.6	15.2	10.4	7.8	9.1
Biotite	76	75	98	72	Biotite	15.2	15.0	15.1	19.6	14.4	17.0
K-feldspar	28	54	58	119	K-feldspar	5.6	10.8	8.2	11.6	23.8	17.7
Zirkon	1	1	1	3	Zirkon	0.2	0.2	0.2	0.2	0.6	0.4
Epidote	8	7	18	27	Epidote	1.6	1.4	1.5	3.6	5.4	4.5
Titanite	5	10	2	0	Titanite	1.0	2.0	1.5	0.4	0.0	0.2
Unknown	9	11	10	5	Unknown	1.8	2.2	2.0	2.0	1.0	1.5
Fe-oxide	2	0	3	2	Fe-oxide	0.4	0.0	0.2	0.6	0.4	0.5
Not valid	43	73	25	31	Not valid						
Sum	542	573	525	531	Sum	99.8	100.0	99.9	100.0	100.0	100.0

Classification of rock type		HV mean	M mean	normalized HV	normalized M	HV	M
Quartz	Q	9.1	15.2	68.2	28.8	Q'	12
Plagioclase	P	49.1	56	6.1	3.8	P'	65
Alkali feldspar	A	17.7	8.2	22.7	38.5	A'	23
Feldspathoids	F	0	0	0.0	0.0	F'	0
Mafic + accessories	M	17	15.1	3.0	28.8	M'	
Sum		92.9	94.5	100	100		

Table A1-13. Calculation of atomic % from wt % oxide using analysis results from ALS Scandinavia.

HV drill core	wt%	M oxide	mole oxide / 100 g	mole element / 100 g	atomic%		HV 0.5–1 mm	wt%	M oxide	mole oxide / 100 g	mole element / 100 g	atomic%	
SiO ₂	60.400	60.083	1.005	1.005	52.116	Si	SiO ₂	62.000	60.083	1.032	1.032	53.335	Si
Al ₂ O ₃	17.100	101.961	0.168	0.398	20.626	Al	Al ₂ O ₃	17.900	101.961	0.176	0.416	21.526	Al
CaO	3.620	56.077	0.065	0.065	3.347	Ca	CaO	4.180	56.077	0.075	0.075	3.853	Ca
Fe ₂ O ₃	7.790	159.687	0.049	0.108	5.621	Fe	Fe ₂ O ₃	5.800	159.687	0.036	0.081	4.173	Fe
K ₂ O	4.500	94.195	0.048	0.163	8.469	K	K ₂ O	3.310	94.195	0.035	0.120	6.210	K
MgO	1.860	40.304	0.046	0.046	2.393	Mg	MgO	1.970	40.304	0.049	0.049	2.526	Mg
MnO	0.109	70.937	0.002	0.002	0.080	Mn	MnO	0.098	70.937	0.001	0.001	0.071	Mn
Na ₂ O	4.010	61.979	0.065	0.129	6.709	Na	Na ₂ O	4.650	61.979	0.075	0.150	7.756	Na
P ₂ O ₅	0.318	141.943	0.002	0.004	0.232	P	P ₂ O ₅	0.226	141.943	0.002	0.003	0.165	P
TiO ₂	0.628	79.865	0.008	0.008	0.408	Ti	TiO ₂	0.595	79.865	0.007	0.007	0.385	Ti
Sum	100.335		1.527	1.929	100.000		Sum	100.729		1.549	1.935	100.000	

M drill core	wt%	M oxide	mole oxide / 100 g	mole element / 100 g	atomic%		M 0.5–1 mm	wt%	M oxide	mole oxide / 100 g	mole element / 100 g	atomic%	
SiO ₂	57.400	60.083	0.955	0.955	49.998	Si	SiO ₂	60.500	60.083	1.007	1.007	52.306	Si
Al ₂ O ₃	17.400	101.961	0.171	0.405	21.187	Al	Al ₂ O ₃	17.900	101.961	0.176	0.416	21.634	Al
CaO	4.520	56.077	0.081	0.081	4.218	Ca	CaO	4.050	56.077	0.072	0.072	3.752	Ca
Fe ₂ O ₃	9.760	159.687	0.061	0.136	7.110	Fe	Fe ₂ O ₃	6.190	159.687	0.039	0.086	4.476	Fe
K ₂ O	2.810	94.195	0.030	0.102	5.338	K	K ₂ O	3.470	94.195	0.037	0.126	6.543	K
MgO	2.570	40.304	0.064	0.064	3.337	Mg	MgO	2.110	40.304	0.052	0.052	2.720	Mg
MnO	0.140	70.937	0.002	0.002	0.103	Mn	MnO	0.114	70.937	0.002	0.002	0.083	Mn
Na ₂ O	4.620	61.979	0.075	0.149	7.802	Na	Na ₂ O	4.680	61.979	0.076	0.151	7.845	Na
P ₂ O ₅	0.427	141.943	0.003	0.006	0.315	P	P ₂ O ₅	0.287	141.943	0.002	0.004	0.210	P
TiO ₂	0.901	79.865	0.011	0.011	0.590	Ti	TiO ₂	0.663	79.865	0.008	0.008	0.431	Ti
Sum	100.548		1.512	1.911	100.000		Sum	99.964		1.533	1.925	100.000	

A2.1 N₂ adsorption isotherms (as referenced to in Section 3.2.1) for the HV sample size fraction 0.25–0.5 mm



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Sample: STONE8
Operator:
Submitter:
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Sample: STONE8
Operator:
Submitter:
File: D:\DATA\2020\EVA\STONE8.SMP

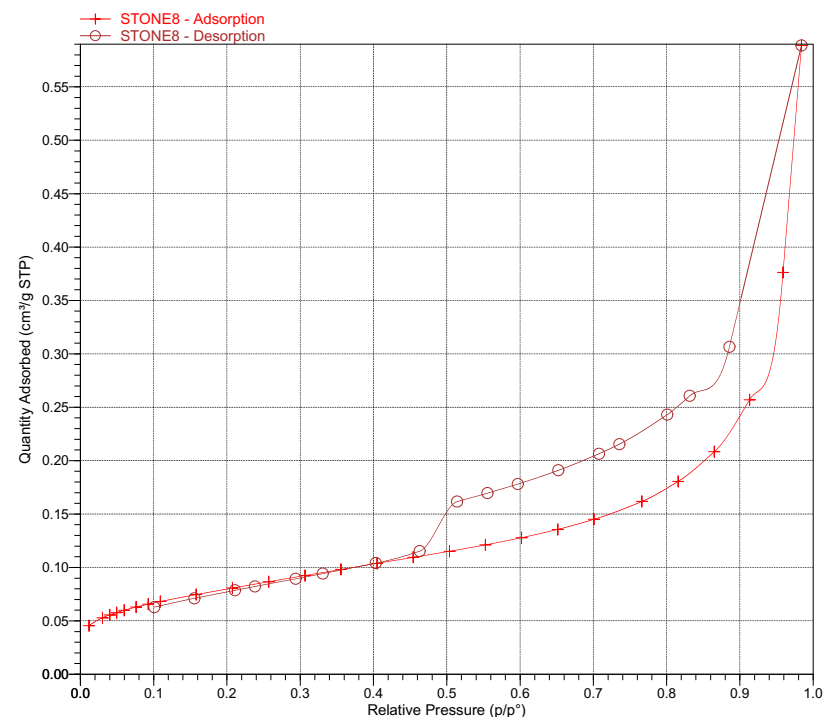
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Completed: 2010-08-27 19:02:17 Analysis Bath Temp.: -195.671 °C
Report Time: 2010-08-30 13:45:58 Thermal Correction: No
Sample Mass: 12.7631 g Smoothed Pressures: No
Warm Free Space: 23.3044 cm³ Measured Cold Free Space: 67.3010 cm³
Equilibration Interval: 10 s Low Pressure Dose: None
Automatic Degas: Yes

Started: 2010-08-27 13:30:49 Analysis Adsorptive: N2
Completed: 2010-08-27 19:02:17 Analysis Bath Temp.: -195.671 °C
Report Time: 2010-08-30 13:45:58 Thermal Correction: No
Sample Mass: 12.7631 g Smoothed Pressures: No
Warm Free Space: 23.3044 cm³ Measured Cold Free Space: 67.3010 cm³
Equilibration Interval: 10 s Low Pressure Dose: None
Automatic Degas: Yes

Isotherm Tabular Report

Relative Pressure (p/p°)	Absolute Pressure (mmHg)	Quantity Adsorbed (cm ³ /g STP)	Elapsed Time (h:min)	Saturation Pressure (mmHg)
			01:38	771.64301
0.011722209	9.04161	0.0455	03:12	
0.030050761	23.17853	0.0529	03:15	
0.040187232	30.99651	0.0556	03:18	
0.049518831	38.19349	0.0577	03:21	
0.059651432	46.00808	0.0599	03:24	
0.076094372	58.68944	0.0629	03:27	
0.092588298	71.41011	0.0656	03:29	
0.109096425	84.14114	0.0681	03:32	
0.158093131	121.92900	0.0746	03:34	
0.207663446	160.15788	0.0807	03:37	
0.257094660	198.27847	0.0866	03:40	
			03:43	771.21279
0.306574610	236.43564	0.0925	03:45	
0.355482879	274.15454	0.0981	03:48	
0.404856579	312.23239	0.1038	03:50	
0.454147694	350.24655	0.1095	03:53	
0.503555226	388.35049	0.1152	03:55	
0.552780219	426.31366	0.1212	03:58	
0.602067377	464.32477	0.1279	04:00	
0.651503005	502.45038	0.1357	04:03	
0.700789530	540.46100	0.1451	04:05	
0.766139527	590.86005	0.1618	04:07	
0.815692680	629.07629	0.1806	04:10	
0.864916683	667.03870	0.2084	04:13	
0.913206819	704.28088	0.2571	04:15	
0.958798473	739.44196	0.3762	04:19	
0.983908195	758.80701	0.5888	04:25	
0.885792344	683.13837	0.3067	04:30	
0.831478999	641.25098	0.2607	04:32	
0.800880115	617.65259	0.2431	04:35	
0.735694652	567.38043	0.2155	04:39	
0.707846166	545.90320	0.2065	04:42	
0.652372372	503.12085	0.1909	04:44	
0.596830596	460.28607	0.1781	04:47	
0.555663891	428.53760	0.1696	04:51	
0.514148569	396.52026	0.1617	04:53	
0.463011443	357.08243	0.1153	04:57	
0.403134582	310.90436	0.1041	05:00	
0.330779904	255.10318	0.0942	05:03	
0.293782662	226.57027	0.0893	05:05	
0.238328990	183.80344	0.0822	05:08	
0.210895837	162.64651	0.0785	05:11	
0.155579079	119.98528	0.0711	05:14	
0.100930492	77.83934	0.0628	05:16	

Isotherm Linear Plot





Sample: STONE8
 Operator:
 Submitter:
 File: D:\DATA\2020\EVA\STONE8.SMP

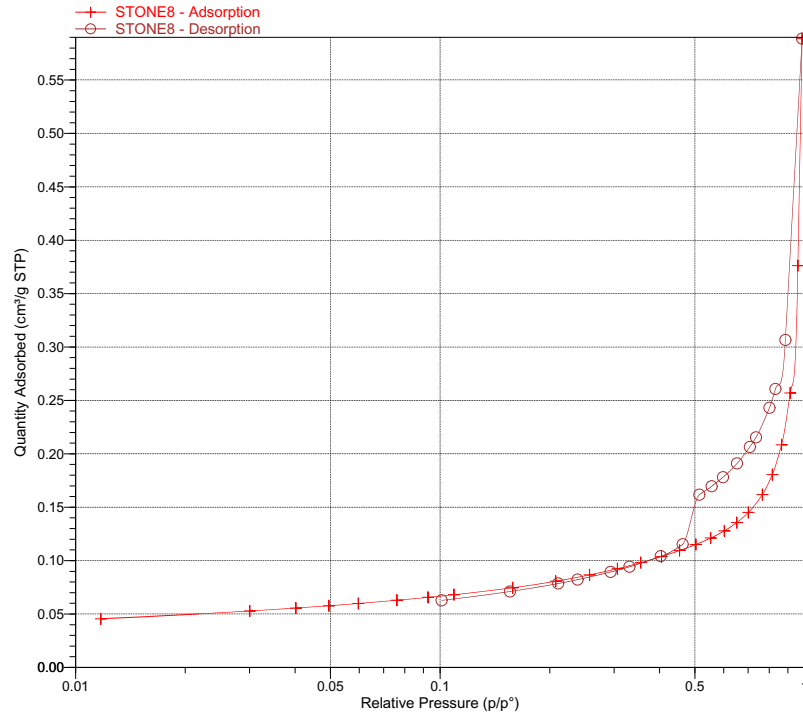
Started: 2010-08-27 13:30:49 Analysis Adsorptive: N2
 Completed: 2010-08-27 19:02:17 Analysis Bath Temp.: -195.671 °C
 Report Time: 2010-08-30 13:45:58 Thermal Correction: No
 Sample Mass: 12.7631 g Smoothed Pressures: No
 Warm Free Space: 23.3044 cm³ Measured Cold Free Space: 67.3010 cm³
 Equilibration Interval: 10 s Low Pressure Dose: None
 Automatic Degas: Yes



Sample: STONE8
 Operator:
 Submitter:
 File: D:\DATA\2020\EVA\STONE8.SMP

Started: 2010-08-27 13:30:49 Analysis Adsorptive: N2
 Completed: 2010-08-27 19:02:17 Analysis Bath Temp.: -195.671 °C
 Report Time: 2010-08-30 13:45:58 Thermal Correction: No
 Sample Mass: 12.7631 g Smoothed Pressures: No
 Warm Free Space: 23.3044 cm³ Measured Cold Free Space: 67.3010 cm³
 Equilibration Interval: 10 s Low Pressure Dose: None
 Automatic Degas: Yes

Isotherm Log Plot



BET Surface Area Report

BET Surface Area: 0.2834 ± 0.0026 m²/g
 Slope: 15.230264 ± 0.139239 g/cm³ STP
 Y-Intercept: 0.130975 ± 0.028776 g/cm³ STP
 C: 117.283795
 Qm: 0.0651 cm³/g STP
 Correlation Coefficient: 0.9997076
 Molecular Cross-Sectional Area: 0.1620 nm²

Relative Pressure (p/p°)	Quantity Adsorbed (cm ³ /g STP)	1/[Q(p°p - 1)]
0.059651432	0.0599	1.059576
0.076094372	0.0629	1.309491
0.092588298	0.0656	1.556286
0.109096425	0.0681	1.799131
0.158093131	0.0746	2.517359
0.207663446	0.0807	3.247940
0.257094660	0.0866	3.994362
0.306574610	0.0925	4.782029
0.355482879	0.0981	5.621256



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Sample: STONE8
 Operator:
 Submitter:
 File: D:\DATA\2020\EVA\STONE8.SMP

Started: 2010-08-27 13:30:49	Analysis Adsorptive: N2
Completed: 2010-08-27 19:02:17	Analysis Bath Temp.: -195.671 °C
Report Time: 2010-08-30 13:45:58	Thermal Correction: No
Sample Mass: 12.7631 g	Smoothed Pressures: No
Warm Free Space: 23.3044 cm ³ Measured	Cold Free Space: 67.3010 cm ³
Equilibration Interval: 10 s	Low Pressure Dose: None
Automatic Degas: Yes	

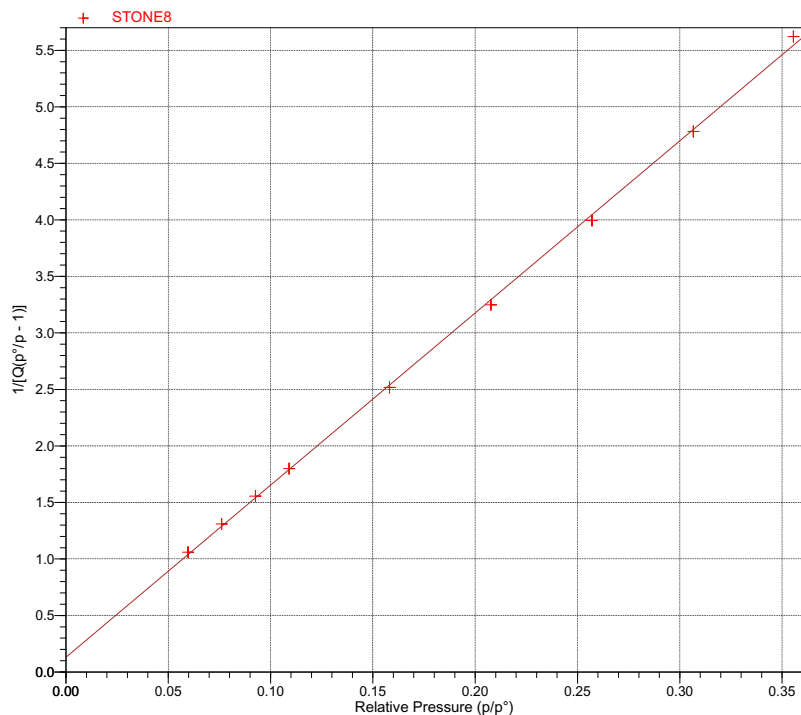


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Sample: STONE8
 Operator:
 Submitter:
 File: D:\DATA\2020\EVA\STONE8.SMP

Started: 2010-08-27 13:30:49	Analysis Adsorptive: N2
Completed: 2010-08-27 19:02:17	Analysis Bath Temp.: -195.671 °C
Report Time: 2010-08-30 13:45:58	Thermal Correction: No
Sample Mass: 12.7631 g	Smoothed Pressures: No
Warm Free Space: 23.3044 cm ³ Measured	Cold Free Space: 67.3010 cm ³
Equilibration Interval: 10 s	Low Pressure Dose: None
Automatic Degas: Yes	

BET Surface Area Plot



Langmuir Reports

Primary Data
 4052- Fewer than two points are selected for this report.



Sample: STONE8
 Operator:
 Submitter:
 File: D:\DATA\2020\EVA\STONE8.SMP

Started: 2010-08-27 13:30:49 Analysis Adsorptive: N2
 Completed: 2010-08-27 19:02:17 Analysis Bath Temp.: -195.671 °C
 Report Time: 2010-08-30 13:45:58 Thermal Correction: No
 Sample Mass: 12.7631 g Smoothed Pressures: No
 Warm Free Space: 23.3044 cm³ Measured Cold Free Space: 67.3010 cm³
 Equilibration Interval: 10 s Low Pressure Dose: None
 Automatic Degas: Yes

t-Plot Report

Micropore Volume: -0.000004 cm³/g STP
 Micropore Area: *
 External Surface Area: 0.2919 m²/g
 Slope: 0.018871 ± 0.000057 cm³/g·Å STP
 Y-Intercept: -0.002692 ± 0.000236 cm³/g STP
 Correlation Coefficient: 0.999986
 Surface Area Correction Factor: 1.000
 Density Conversion Factor: 0.0015468
 Total Surface Area (BET): 0.2834 m²/g
 Thickness Range: 3.5000 Å to 5.0000 Å
 Thickness Equation: Harkins and Jura
 $t = [13.99 / (0.034 - \log(p/p^0))] ^ 0.5$

Relative Pressure (p/p ⁰)	Statistical Thickness (Å)	Quantity Adsorbed (cm³/g STP)
0.011722209	2.6683	0.0455
0.030050761	2.9984	0.0529
0.040187232	3.1279	0.0556
0.049518831	3.2321	0.0577
0.059651432	3.3343	0.0599
0.076094372	3.4839	0.0629
0.092588298	3.6202	0.0656
0.109096425	3.7475	0.0681
0.158093131	4.0930	0.0746
0.207663446	4.4183	0.0807
0.257094660	4.7353	0.0866
0.306574610	5.0551	0.0925
0.355482879	5.3809	0.0981
0.404856579	5.7260	0.1038
0.454147694	6.0933	0.1095
0.503555226	6.4919	0.1152
0.552780219	6.9283	0.1212
0.602067377	7.4163	0.1279
0.651503005	7.9729	0.1357
0.700789530	8.6170	0.1451
0.766139527	9.6674	0.1618
0.815692680	10.6878	0.1806
0.864916683	12.0079	0.2084
0.913206819	13.8029	0.2571
0.958798473	16.3596	0.3762
0.983908195	18.4619	0.5888

* The micropore area is not reported because either the micropore volume is negative or the calculated external surface area is larger than the total surface area.

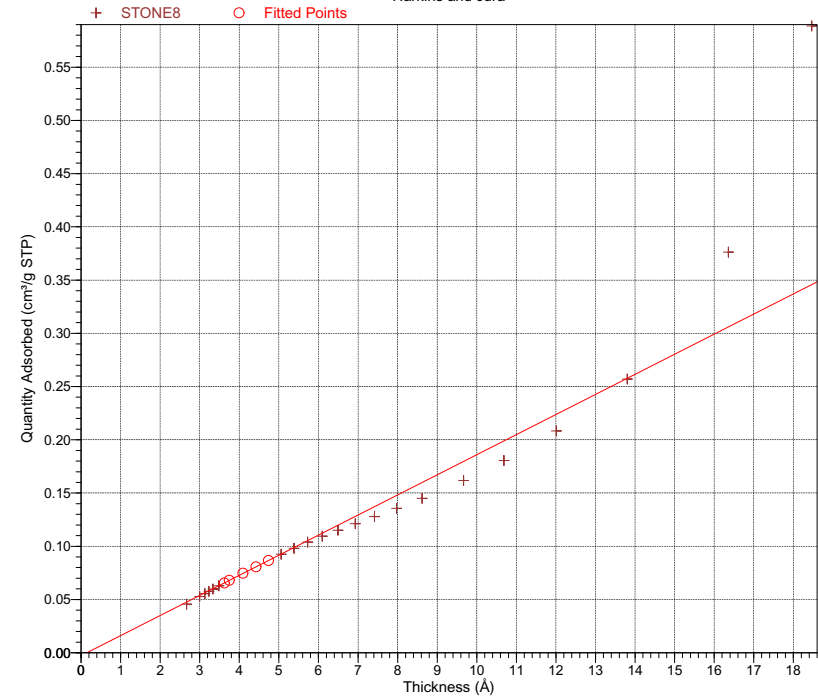


Sample: STONE8
 Operator:
 Submitter:
 File: D:\DATA\2020\EVA\STONE8.SMP

Started: 2010-08-27 13:30:49 Analysis Adsorptive: N2
 Completed: 2010-08-27 19:02:17 Analysis Bath Temp.: -195.671 °C
 Report Time: 2010-08-30 13:45:58 Thermal Correction: No
 Sample Mass: 12.7631 g Smoothed Pressures: No
 Warm Free Space: 23.3044 cm³ Measured Cold Free Space: 67.3010 cm³
 Equilibration Interval: 10 s Low Pressure Dose: None
 Automatic Degas: Yes

t-Plot

Harkins and Jura





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Sample: STONE8
 Operator:
 Submitter:
 File: D:\DATA\2020\EVA\STONE8.SMP

Started: 2010-08-27 13:30:49 Analysis Adsorptive: N2
 Completed: 2010-08-27 19:02:17 Analysis Bath Temp.: -195.671 °C
 Report Time: 2010-08-30 13:45:58 Thermal Correction: No
 Sample Mass: 12.7631 g Smoothed Pressures: No
 Warm Free Space: 23.3044 cm³ Measured Cold Free Space: 67.3010 cm³
 Equilibration Interval: 10 s Low Pressure Dose: None
 Automatic Degas: Yes

BJH Adsorption Pore Distribution Report

$t = 3.54 [-5 / \ln(p/p^*)]^{\wedge} 0.333$

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)
1219.7 - 484.9	580.5	0.000368	0.000368	0.025	0.025
484.9 - 233.9	278.6	0.000209	0.000577	0.030	0.055
233.9 - 151.4	174.8	0.000083	0.000661	0.019	0.074
151.4 - 111.2	124.8	0.000047	0.000707	0.015	0.089
111.2 - 87.4	96.3	0.000031	0.000739	0.013	0.102
87.4 - 67.8	74.9	0.000027	0.000765	0.014	0.117
67.8 - 57.6	61.8	0.000015	0.000780	0.009	0.126
57.6 - 49.8	53.1	0.000012	0.000792	0.009	0.135
49.8 - 43.7	46.3	0.000010	0.000802	0.009	0.144
43.7 - 38.6	40.8	0.000009	0.000811	0.009	0.153
38.6 - 34.3	36.2	0.000009	0.000820	0.010	0.162
34.3 - 30.7	32.3	0.000009	0.000829	0.011	0.174
30.7 - 27.5	28.9	0.000010	0.000839	0.014	0.187
27.5 - 24.7	25.9	0.000010	0.000848	0.015	0.202
24.7 - 22.1	23.2	0.000010	0.000859	0.018	0.220
22.1 - 19.6	20.7	0.000011	0.000869	0.020	0.241
19.6 - 17.3	18.3	0.000010	0.000879	0.022	0.263

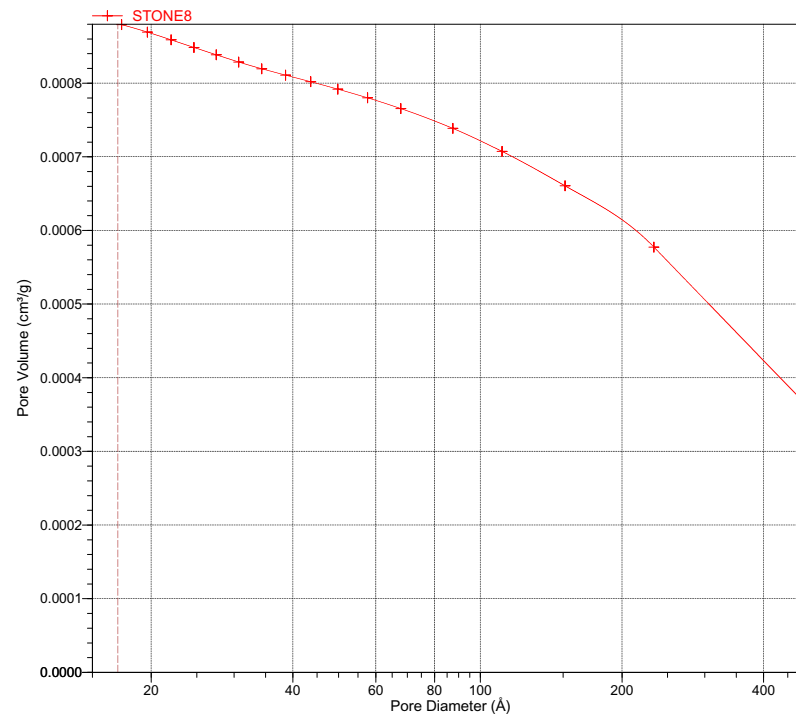


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Sample: STONE8
 Operator:
 Submitter:
 File: D:\DATA\2020\EVA\STONE8.SMP

Started: 2010-08-27 13:30:49 Analysis Adsorptive: N2
 Completed: 2010-08-27 19:02:17 Analysis Bath Temp.: -195.671 °C
 Report Time: 2010-08-30 13:45:58 Thermal Correction: No
 Sample Mass: 12.7631 g Smoothed Pressures: No
 Warm Free Space: 23.3044 cm³ Measured Cold Free Space: 67.3010 cm³
 Equilibration Interval: 10 s Low Pressure Dose: None
 Automatic Degas: Yes

BJH Adsorption Cumulative Pore Volume





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Sample: STONE8
 Operator:
 Submitter:
 File: D:\DATA\2020\EVA\STONE8.SMP

Started: 2010-08-27 13:30:49	Analysis Adsorptive: N2
Completed: 2010-08-27 19:02:17	Analysis Bath Temp.: -195.671 °C
Report Time: 2010-08-30 13:45:58	Thermal Correction: No
Sample Mass: 12.7631 g	Smoothed Pressures: No
Warm Free Space: 23.3044 cm ³ Measured	Cold Free Space: 67.3010 cm ³
Equilibration Interval: 10 s	Low Pressure Dose: None
Automatic Degas: Yes	

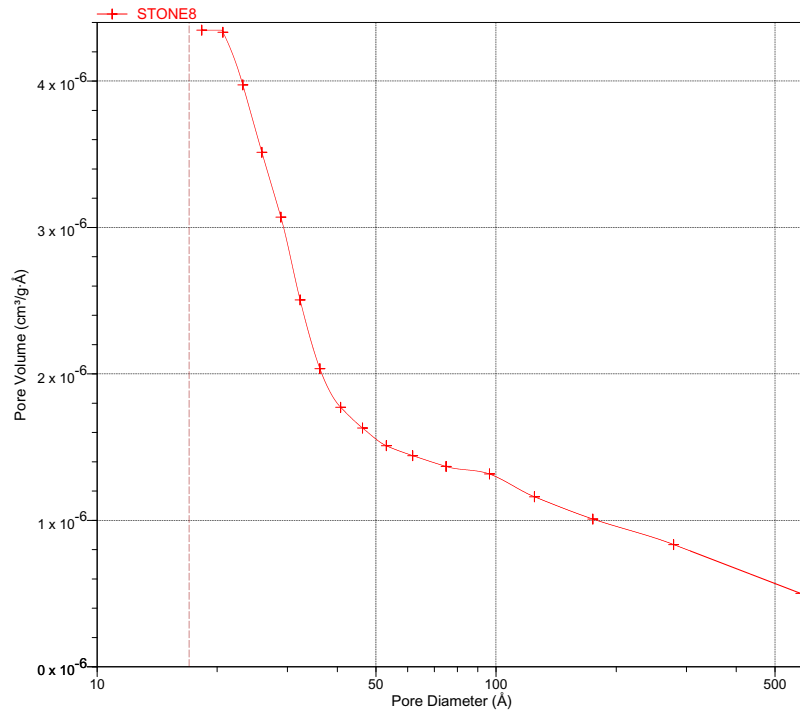


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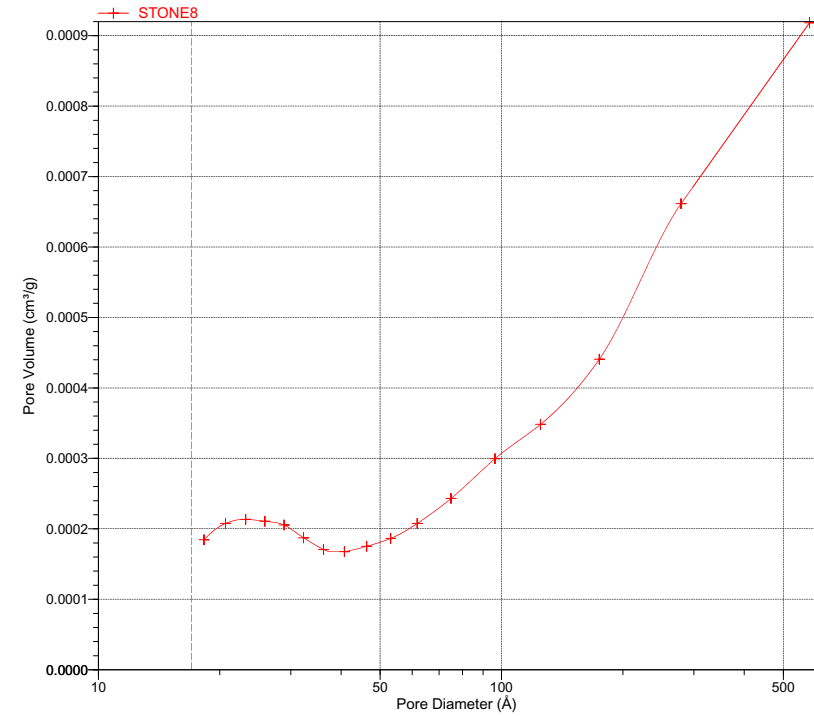
Sample: STONE8
 Operator:
 Submitter:
 File: D:\DATA\2020\EVA\STONE8.SMP

Started: 2010-08-27 13:30:49	Analysis Adsorptive: N2
Completed: 2010-08-27 19:02:17	Analysis Bath Temp.: -195.671 °C
Report Time: 2010-08-30 13:45:58	Thermal Correction: No
Sample Mass: 12.7631 g	Smoothed Pressures: No
Warm Free Space: 23.3044 cm ³ Measured	Cold Free Space: 67.3010 cm ³
Equilibration Interval: 10 s	Low Pressure Dose: None
Automatic Degas: Yes	

BJH Adsorption dV/dD Pore Volume



BJH Adsorption dV/dlog(D) Pore Volume





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Sample: STONE8
 Operator:
 Submitter:
 File: D:\DATA\2020\EVA\STONE8.SMP

Started: 2010-08-27 13:30:49 Analysis Adsorptive: N2
 Completed: 2010-08-27 19:02:17 Analysis Bath Temp.: -195.671 °C
 Report Time: 2010-08-30 13:45:58 Thermal Correction: No
 Sample Mass: 12.7631 g Smoothed Pressures: No
 Warm Free Space: 23.3044 cm³ Measured Cold Free Space: 67.3010 cm³
 Equilibration Interval: 10 s Low Pressure Dose: None
 Automatic Degas: Yes

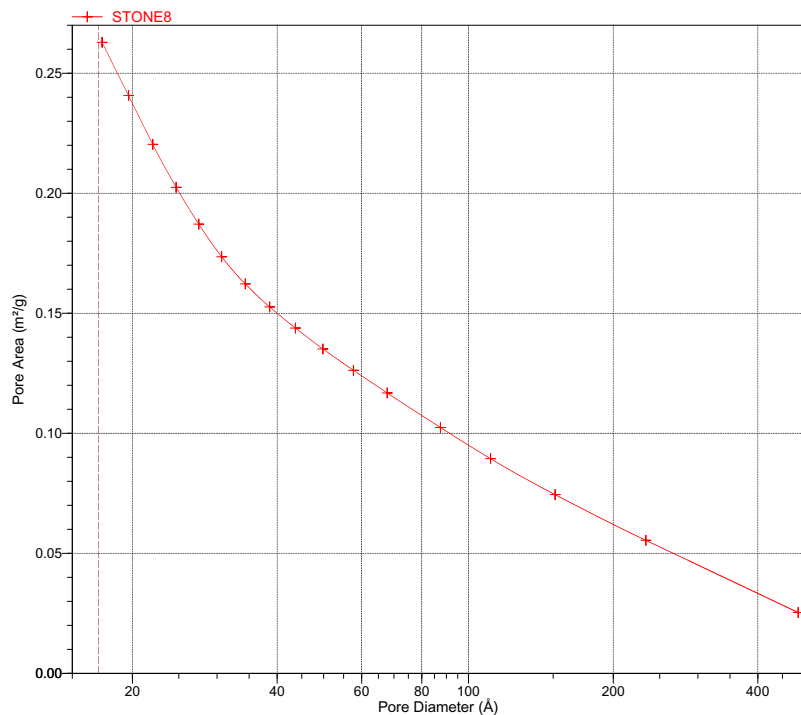


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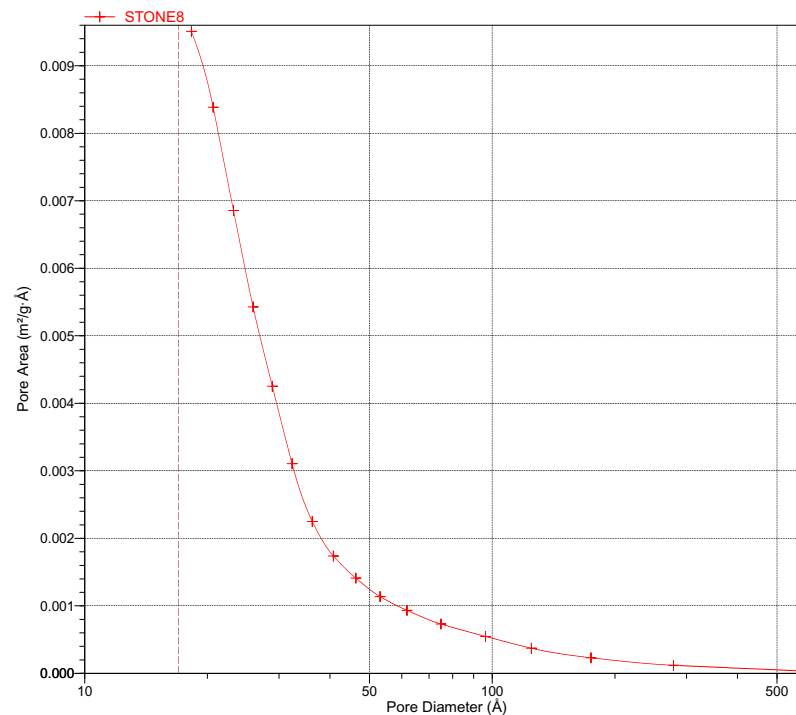
Sample: STONE8
 Operator:
 Submitter:
 File: D:\DATA\2020\EVA\STONE8.SMP

Started: 2010-08-27 13:30:49 Analysis Adsorptive: N2
 Completed: 2010-08-27 19:02:17 Analysis Bath Temp.: -195.671 °C
 Report Time: 2010-08-30 13:45:58 Thermal Correction: No
 Sample Mass: 12.7631 g Smoothed Pressures: No
 Warm Free Space: 23.3044 cm³ Measured Cold Free Space: 67.3010 cm³
 Equilibration Interval: 10 s Low Pressure Dose: None
 Automatic Degas: Yes

BJH Adsorption Cumulative Pore Area



BJH Adsorption dA/dD Pore Area





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Sample: STONE8
 Operator:
 Submitter:
 File: D:\DATA\2020\EVA\STONE8.SMP

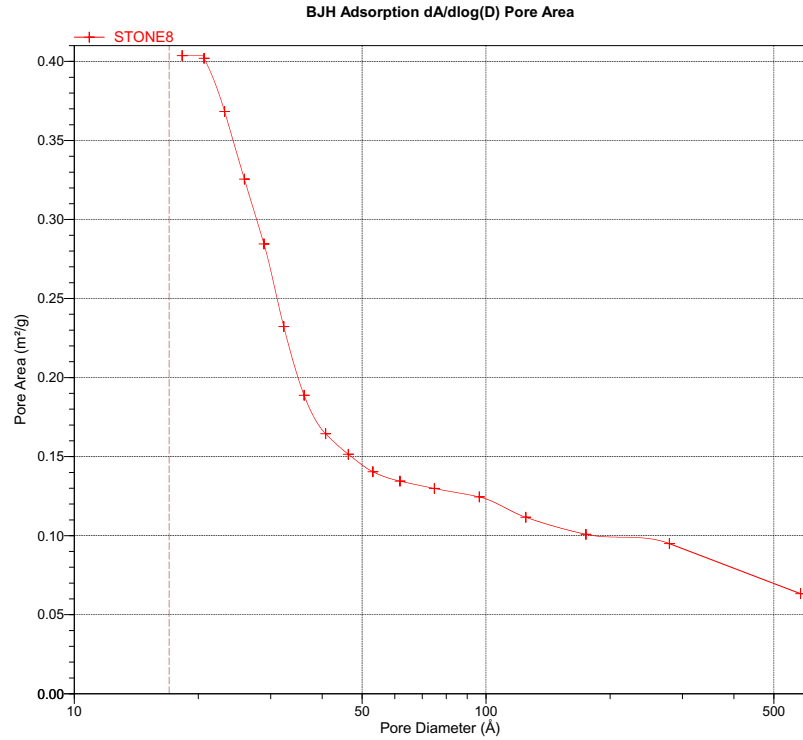
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 Completed: 2010-08-27 19:02:17 Analysis Bath Temp.: -195.671 °C
 Report Time: 2010-08-30 13:45:58 Thermal Correction: No
 Sample Mass: 12.7631 g Smoothed Pressures: No
 Warm Free Space: 23.3044 cm³ Measured Cold Free Space: 67.3010 cm³
 Equilibration Interval: 10 s Low Pressure Dose: None
 Automatic Degas: Yes



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Sample: STONE8
 Operator:
 Submitter:
 File: D:\DATA\2020\EVA\STONE8.SMP

Started: 2010-08-27 13:30:49 Analysis Adsorptive: N2
 Completed: 2010-08-27 19:02:17 Analysis Bath Temp.: -195.671 °C
 Report Time: 2010-08-30 13:45:58 Thermal Correction: No
 Sample Mass: 12.7631 g Smoothed Pressures: No
 Warm Free Space: 23.3044 cm³ Measured Cold Free Space: 67.3010 cm³
 Equilibration Interval: 10 s Low Pressure Dose: None
 Automatic Degas: Yes



Horvath-Kawazoe Report

Slit Pore Geometry (Original H-K)
 Maximum Pore Volume: 0.000911 cm³/g
 at Relative Pressure: 0.983908195
 Median Pore Width: 500.634 Å
 Relative Pressure Range: 1.172e-02 to 9.839e-01
 Diameter of Adsorptive Molecule: 3.000 Å
 Diameter of Adsorptive at Zero Interaction Energy: 2.574 Å
 Diameter of Sample Atom: 3.040 Å
 Diameter of Sample Atom at Zero Interaction Energy: 2.609 Å
 Interaction Parameter: 3.49e-43 erg·cm⁴

Density Conversion Factor: 0.0015468

Absolute Pressure (mmHg)	Relative Pressure (p/p ⁰)	Quantity Adsorbed (cm ³ /g STP)	Pore Width (Å)	Cumulative Pore Volume (cm ³ /g)	Differential Pore Volume (cm ³ /g-Å)
9.04161	0.011722209	0.0455	10.490	0.0001	0.0000
23.17853	0.030050761	0.0529	12.614	0.0001	0.0000
30.99651	0.040187232	0.0556	13.516	0.0001	0.0000
38.19349	0.049518831	0.0577	14.269	0.0001	0.0000
46.00808	0.059651432	0.0599	15.031	0.0001	0.0000
58.68944	0.076094372	0.0629	16.188	0.0001	0.0000
71.41011	0.092588298	0.0656	17.303	0.0001	0.0000
84.14114	0.109096425	0.0681	18.379	0.0001	0.0000
121.92900	0.158093131	0.0746	21.506	0.0001	0.0000
160.15788	0.207663446	0.0807	24.722	0.0001	0.0000
198.27847	0.257094660	0.0866	28.164	0.0001	0.0000
236.43564	0.306574610	0.0925	31.909	0.0001	0.0000
274.15454	0.355482879	0.0981	36.102	0.0002	0.0000
312.23239	0.404856579	0.1038	40.839	0.0002	0.0000
350.24655	0.454147694	0.1095	46.323	0.0002	0.0000
388.35049	0.503555226	0.1152	52.839	0.0002	0.0000
426.31366	0.552780219	0.1212	60.663	0.0002	0.0000
464.32477	0.602067377	0.1279	70.345	0.0002	0.0000
502.45038	0.651503005	0.1357	82.821	0.0002	0.0000
540.46100	0.700789530	0.1451	99.134	0.0002	0.0000
590.86005	0.766139527	0.1618	131.830	0.0003	0.0000
629.07629	0.815692680	0.1806	170.943	0.0003	0.0000
667.03870	0.864916683	0.2084	238.796	0.0003	0.0000
704.28088	0.913206819	0.2571	383.898	0.0004	0.0000
739.44196	0.958798473	0.3762	809.529	0.0006	0.0000
758.80701	0.983908195	0.5888	2028.382	0.0009	0.0000



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Unit 1

Serial #: 182

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Sample: STONE8
 Operator:
 Submitter:
 File: D:\DATA\2020\EVA\STONE8.SMP

Started: 2010-08-27 13:30:49
 Completed: 2010-08-27 19:02:17
 Report Time: 2010-08-30 13:45:58
 Sample Mass: 12.7631 g
 Warm Free Space: 23.3044 cm³ Measured
 Equilibration Interval: 10 s
 Automatic Degas: Yes

Analysis Adsorptive: N₂
 Analysis Bath Temp.: -195.671 °C
 Thermal Correction: No
 Smoothed Pressures: No
 Cold Free Space: 67.3010 cm³
 Low Pressure Dose: None



ASAP 2020 V1.05 H

Unit 1

Serial #: 182

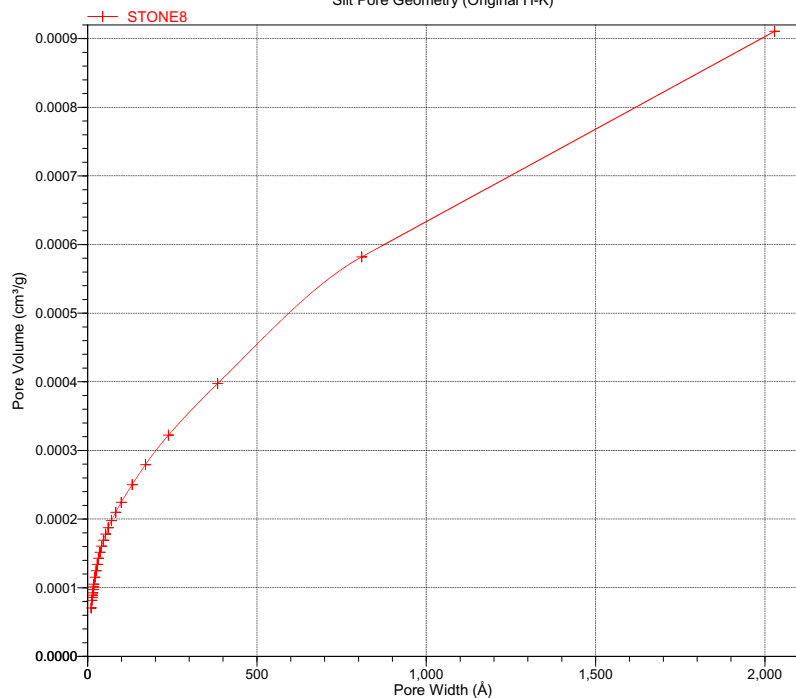
Page 18

Sample: STONE8
 Operator:
 Submitter:
 File: D:\DATA\2020\EVA\STONE8.SMP

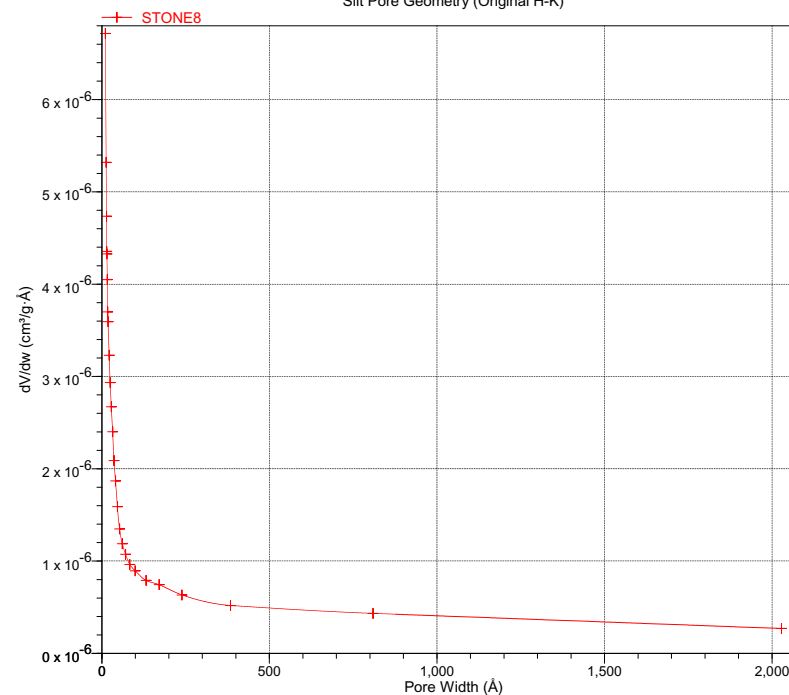
Started: 2010-08-27 13:30:49
 Completed: 2010-08-27 19:02:17
 Report Time: 2010-08-30 13:45:58
 Sample Mass: 12.7631 g
 Warm Free Space: 23.3044 cm³ Measured
 Equilibration Interval: 10 s
 Automatic Degas: Yes

Analysis Adsorptive: N₂
 Analysis Bath Temp.: -195.671 °C
 Thermal Correction: No
 Smoothed Pressures: No
 Cold Free Space: 67.3010 cm³
 Low Pressure Dose: None

Horvath-Kawazoe Cumulative Pore Volume Plot
 Slit Pore Geometry (Original H-K)



Horvath-Kawazoe Differential Pore Volume Plot
 Slit Pore Geometry (Original H-K)





ASAP 2020 V1.05 H

Unit 1

Serial #: 182

Page 19

Sample: STONE8
 Operator:
 Submitter:
 File: D:\DATA\2020\EVA\STONE8.SMP

Started: 2010-08-27 13:30:49 Analysis Adsorptive: N2
 Completed: 2010-08-27 19:02:17 Analysis Bath Temp.: -195.671 °C
 Report Time: 2010-08-30 13:45:58 Thermal Correction: No
 Sample Mass: 12.7631 g Smoothed Pressures: No
 Warm Free Space: 23.3044 cm³ Measured Cold Free Space: 67.3010 cm³
 Equilibration Interval: 10 s Low Pressure Dose: None
 Automatic Degas: Yes

Summary Report

Surface Area

Single point surface area at $p/p^* = 0.306574610$: 0.2791 m²/g

BET Surface Area: 0.2834 m²/g

t-Plot External Surface Area: 0.2919 m²/g

BJH Adsorption cumulative surface area of pores
 between 17.000 Å and 3000.000 Å diameter: 0.2629 m²/g

BJH Desorption cumulative surface area of pores
 between 17.000 Å and 3000.000 Å diameter: 0.3851 m²/g

Pore Volume

Single point adsorption total pore volume of pores
 less than 1222.6311 Å at $p/p^* = 0.983908195$: 0.000911 cm³/g

t-Plot micropore volume: -0.000004 cm³/g

BJH Adsorption cumulative volume of pores
 between 17.000 Å and 3000.000 Å diameter: 0.000879 cm³/g

BJH Desorption cumulative volume of pores
 between 17.000 Å and 3000.000 Å diameter: 0.000478 cm³/g

Pore Size

Adsorption average pore width (4V/A by BET): 128.5417 Å

BJH Adsorption average pore diameter (4V/A): 133.826 Å

BJH Desorption average pore diameter (4V/A): 49.651 Å

Horvath-Kawazoe

Maximum pore volume at $p/p^* = 0.983908195$: 0.000911 cm³/g

Median pore width: 500.6344 Å

Dubinin-Radushkevich

Micropore surface area: 0.0000 m²/g

Monolayer capacity: 0.000000 cm³/g

Dubinin-Astakhov

Micropore surface area: 0.2860 m²/g

Limiting micropore volume: 0.000146 cm³/g



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Unit 1

Serial #: 182

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Sample: STONE8
 Operator:
 Submitter:
 File: D:\DATA\2020\EVA\STONE8.SMP

Started: 2010-08-27 13:30:49 Analysis Adsorptive: N2
 Completed: 2010-08-27 19:02:17 Analysis Bath Temp.: -195.671 °C
 Report Time: 2010-08-30 13:45:58 Thermal Correction: No
 Sample Mass: 12.7631 g Smoothed Pressures: No
 Warm Free Space: 23.3044 cm³ Measured Cold Free Space: 67.3010 cm³
 Equilibration Interval: 10 s Low Pressure Dose: None
 Automatic Degas: Yes

Dubinin-Astakhov

MP-Method

Cumulative surface area of pores between
 18.4619 Å and 18.4619 Å hydraulic radius: 0.0000 m²/g

Cumulative pore volume of pores between
 18.4619 Å and 18.4619 Å hydraulic radius: 0.000000 cm³/g

Average pore hydraulic radius (V/A): 0.0000 Å

A2.2 N₂ adsorption isotherms (as referenced to in Section 3.2.1) for the HV sample size fraction 0.5–1 mm.



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Unit 1

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Page 1

ASAP 2020 V1.05 H

Unit 1

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Page 2

Sample: STONE3
 Operator:
 Submitter:
 File: D:\DATA\2020\EVA\STONE3.SMP

Started: 2010-08-18 9:26:17
 Completed: 2010-08-18 14:45:14
 Report Time: 2010-08-30 13:52:22
 Sample Mass: 13.6461 g
 Warm Free Space: 22.4610 cm³ Measured
 Equilibration Interval: 10 s
 Automatic Degas: Yes

Analysis Adsorptive: N₂
 Analysis Bath Temp.: -195.755 °C
 Thermal Correction: No
 Smoothed Pressures: No
 Cold Free Space: 65.3565 cm³
 Low Pressure Dose: None

Sample: STONE3
 Operator:
 Submitter:
 File: D:\DATA\2020\EVA\STONE3.SMP

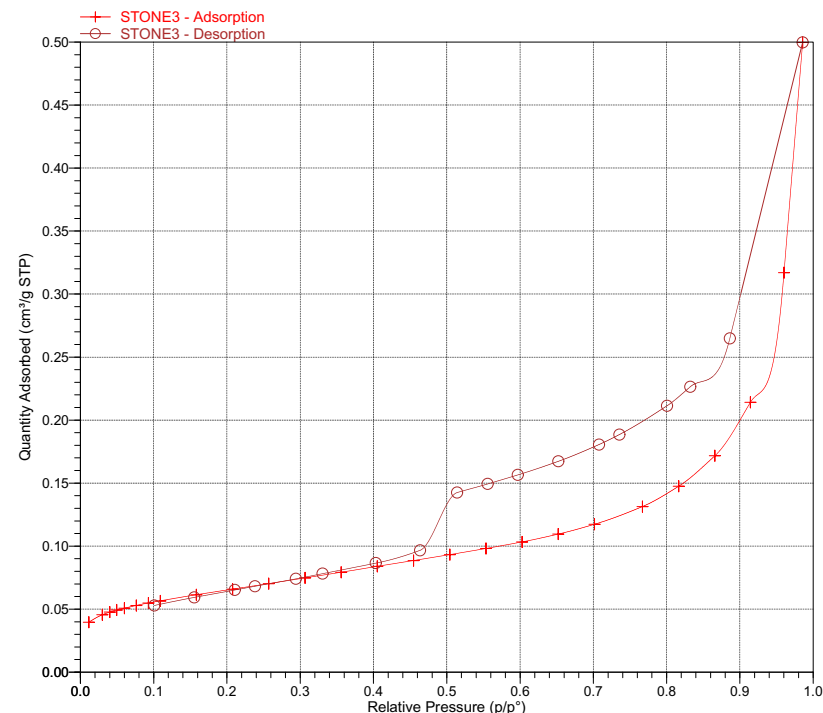
Started: 2010-08-18 9:26:17
 Completed: 2010-08-18 14:45:14
 Report Time: 2010-08-30 13:52:22
 Sample Mass: 13.6461 g
 Warm Free Space: 22.4610 cm³ Measured
 Equilibration Interval: 10 s
 Automatic Degas: Yes

Analysis Adsorptive: N₂
 Analysis Bath Temp.: -195.755 °C
 Thermal Correction: No
 Smoothed Pressures: No
 Cold Free Space: 65.3565 cm³
 Low Pressure Dose: None

Isotherm Tabular Report

Relative Pressure (p/p°)	Absolute Pressure (mmHg)	Quantity Adsorbed (cm ³ /g STP)	Elapsed Time (h:min)	Saturation Pressure (mmHg)
				764.44897
0.011486452	8.77627	0.0396	02:15	
0.029970071	22.89794	0.0455	02:59	
0.039965561	30.53404	0.0476	03:02	
0.049545642	37.85197	0.0493	03:04	
0.059991988	45.83118	0.0507	03:07	
0.076134620	58.16137	0.0529	03:10	
0.092803120	70.89240	0.0549	03:13	
0.109057211	83.30696	0.0566	03:16	
0.158174046	120.82222	0.0614	03:18	
0.207726703	158.66772	0.0659	03:21	
0.257173959	196.43005	0.0703	03:24	
0.306693968	234.24529	0.0748	03:27	
0.355850112	271.78314	0.0793	03:30	
0.405174185	309.44385	0.0840	03:32	
0.454719320	347.27072	0.0886	03:35	
0.504187869	385.03644	0.0933	03:38	
0.553404906	422.60742	0.0981	03:41	
0.602725712	460.26041	0.1034	03:44	
0.652061463	497.91718	0.1095	03:46	
0.701421821	535.59637	0.1174	03:49	
0.767095208	585.72992	0.1314	03:51	
0.816564845	623.48138	0.1476	03:53	
0.865905433	661.13165	0.1717	03:56	
0.914323406	698.08307	0.2141	03:59	
0.960201343	733.07623	0.3170	04:01	
0.985584972	752.40253	0.4997	04:05	
0.886248744	676.52875	0.2649	04:11	
			04:16	
			04:19	763.33521
0.832271724	635.30231	0.2265	04:19	
0.800565531	611.09985	0.2114	04:23	
0.735708293	561.59204	0.1885	04:27	
0.707938138	540.39410	0.1806	04:29	
0.652315151	497.93512	0.1673	04:32	
0.596857758	455.60254	0.1565	04:35	
0.555735409	424.21240	0.1493	04:38	
0.514084014	392.41843	0.1425	04:40	
0.463632345	353.90689	0.0967	04:43	
0.402945464	307.58246	0.0865	04:46	
0.330362754	252.17752	0.0781	04:49	
0.293955579	224.38664	0.0740	04:52	
0.238178412	181.80997	0.0682	04:54	
0.210813207	160.92114	0.0652	04:57	
0.155504557	118.70210	0.0593	04:59	
0.100889926	77.01283	0.0529	05:01	

Isotherm Linear Plot





Sample: STONE3
 Operator:
 Submitter:
 File: D:\DATA\2020\EVA\STONE3.SMP

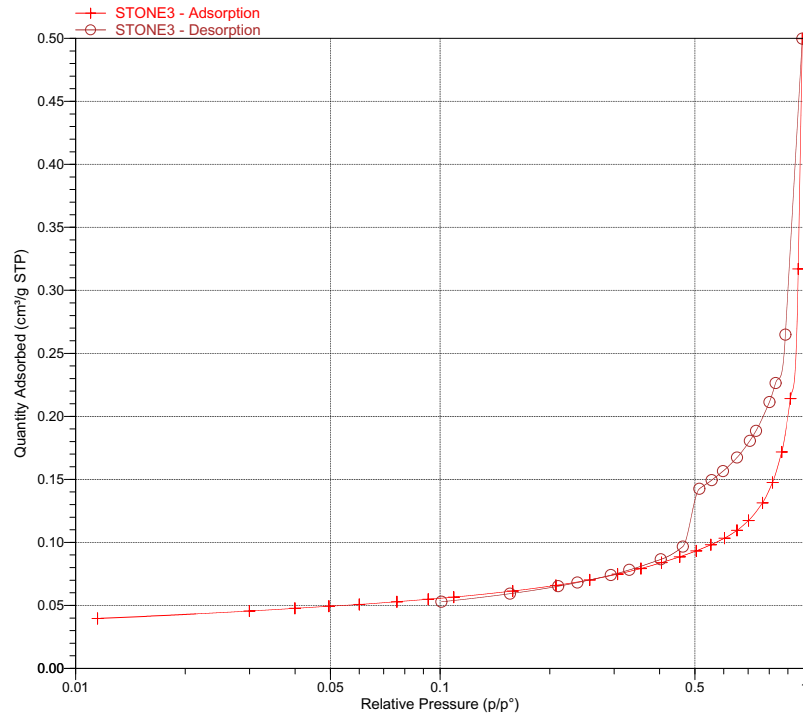
Started: 2010-08-18 9:26:17 Analysis Adsorptive: N2
 Completed: 2010-08-18 14:45:14 Analysis Bath Temp.: -195.755 °C
 Report Time: 2010-08-30 13:52:22 Thermal Correction: No
 Sample Mass: 13.6461 g Smoothed Pressures: No
 Warm Free Space: 22.4610 cm³ Measured Cold Free Space: 65.3565 cm³
 Equilibration Interval: 10 s Low Pressure Dose: None
 Automatic Degas: Yes



Sample: STONE3
 Operator:
 Submitter:
 File: D:\DATA\2020\EVA\STONE3.SMP

Started: 2010-08-18 9:26:17 Analysis Adsorptive: N2
 Completed: 2010-08-18 14:45:14 Analysis Bath Temp.: -195.755 °C
 Report Time: 2010-08-30 13:52:22 Thermal Correction: No
 Sample Mass: 13.6461 g Smoothed Pressures: No
 Warm Free Space: 22.4610 cm³ Measured Cold Free Space: 65.3565 cm³
 Equilibration Interval: 10 s Low Pressure Dose: None
 Automatic Degas: Yes

Isotherm Log Plot



BET Surface Area Report

BET Surface Area: 0.2271 ± 0.0022 m²/g
 Slope: 19.096377 ± 0.181013 g/cm³ STP
 Y-Intercept: 0.075643 ± 0.037434 g/cm³ STP
 C: 253.454621
 Qm: 0.0522 cm³/g STP
 Correlation Coefficient: 0.9996857
 Molecular Cross-Sectional Area: 0.1620 nm²

Relative Pressure (p/p ⁰)	Quantity Adsorbed (cm ³ /g STP)	1/[Q(p ⁰ p - 1)]
0.059991988	0.0507	1.257879
0.076134620	0.0529	1.556438
0.092803120	0.0549	1.864100
0.109057211	0.0566	2.162867
0.158174046	0.0614	3.058585
0.207726703	0.0659	3.978476
0.257173959	0.0703	4.926766
0.306693968	0.0748	5.913240
0.355850112	0.0793	6.967421



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Sample: STONE3
 Operator:
 Submitter:
 File: D:\DATA\2020\EVA\STONE3.SMP

Started: 2010-08-18 9:26:17	Analysis Adsorptive: N2
Completed: 2010-08-18 14:45:14	Analysis Bath Temp.: -195.755 °C
Report Time: 2010-08-30 13:52:22	Thermal Correction: No
Sample Mass: 13.6461 g	Smoothed Pressures: No
Warm Free Space: 22.4610 cm ³ Measured	Cold Free Space: 65.3565 cm ³
Equilibration Interval: 10 s	Low Pressure Dose: None
Automatic Degas: Yes	

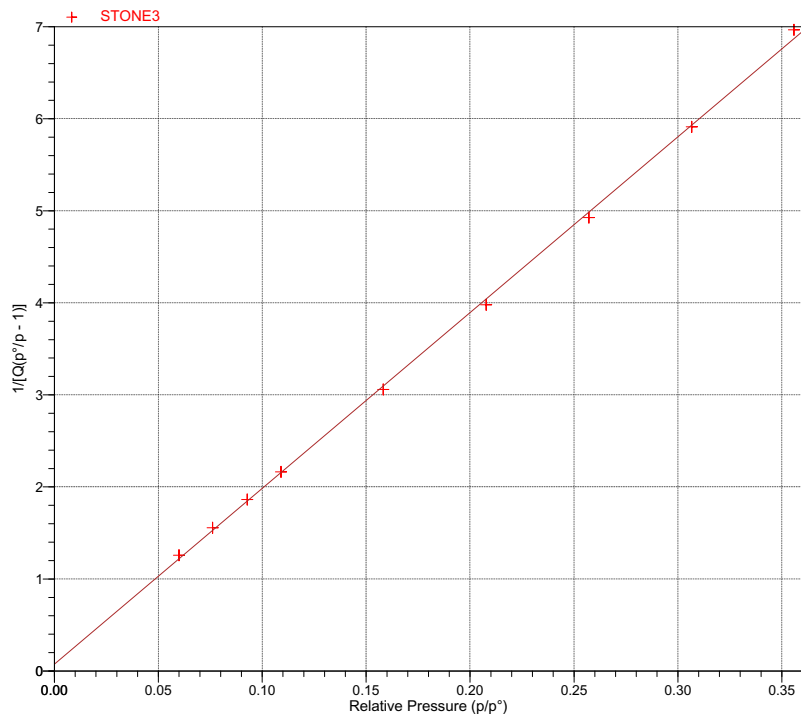


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Sample: STONE3
 Operator:
 Submitter:
 File: D:\DATA\2020\EVA\STONE3.SMP

Started: 2010-08-18 9:26:17	Analysis Adsorptive: N2
Completed: 2010-08-18 14:45:14	Analysis Bath Temp.: -195.755 °C
Report Time: 2010-08-30 13:52:22	Thermal Correction: No
Sample Mass: 13.6461 g	Smoothed Pressures: No
Warm Free Space: 22.4610 cm ³ Measured	Cold Free Space: 65.3565 cm ³
Equilibration Interval: 10 s	Low Pressure Dose: None
Automatic Degas: Yes	

BET Surface Area Plot



Langmuir Reports

Primary Data
 4052- Fewer than two points are selected for this report.



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Unit 1

Serial #: 182

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Sample: STONE3
 Operator:
 Submitter:
 File: D:\DATA\2020\EVA\STONE3.SMP

Started: 2010-08-18 9:26:17 Analysis Adsorptive: N2
 Completed: 2010-08-18 14:45:14 Analysis Bath Temp.: -195.755 °C
 Report Time: 2010-08-30 13:52:22 Thermal Correction: No
 Sample Mass: 13.6461 g Smoothed Pressures: No
 Warm Free Space: 22.4610 cm³ Measured Cold Free Space: 65.3565 cm³
 Equilibration Interval: 10 s Low Pressure Dose: None
 Automatic Degas: Yes

t-Plot Report

Micropore Volume: 0.000007 cm³/g STP
 Micropore Area: 0.0131 m²/g
 External Surface Area: 0.2139 m²/g
 Slope: 0.013829 ± 0.000023 cm³/g·Å STP
 Y-Intercept: 0.004791 ± 0.000095 cm³/g STP
 Correlation Coefficient: 0.999996
 Surface Area Correction Factor: 1.000
 Density Conversion Factor: 0.0015468
 Total Surface Area (BET): 0.2271 m²/g
 Thickness Range: 3.5000 Å to 5.0000 Å
 Thickness Equation: Harkins and Jura
 $t = [13.99 / (0.034 - \log(p/p^0))] ^{0.5}$

Relative Pressure (p/p ⁰)	Statistical Thickness (Å)	Quantity Adsorbed (cm ³ /g STP)
0.011486452	2.6623	0.0396
0.029970071	2.9972	0.0455
0.039965561	3.1253	0.0476
0.049545642	3.2324	0.0493
0.059991988	3.3376	0.0507
0.076134620	3.4842	0.0529
0.092803120	3.6219	0.0549
0.109057211	3.7472	0.0566
0.158174046	4.0936	0.0614
0.207726703	4.4187	0.0659
0.257173959	4.7358	0.0703
0.306693968	5.0559	0.0748
0.355850112	5.3834	0.0793
0.405174185	5.7282	0.0840
0.454719320	6.0977	0.0886
0.504187869	6.4972	0.0933
0.553404906	6.9342	0.0981
0.602725712	7.4233	0.1034
0.652061463	7.9796	0.1095
0.701421821	8.6259	0.1174
0.767095208	9.6849	0.1314
0.816564845	10.7081	0.1476
0.865905433	12.0387	0.1717
0.914323406	13.8530	0.2141
0.960201343	16.4598	0.3170
0.985584972	18.6305	0.4997



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Unit 1

Serial #: 182

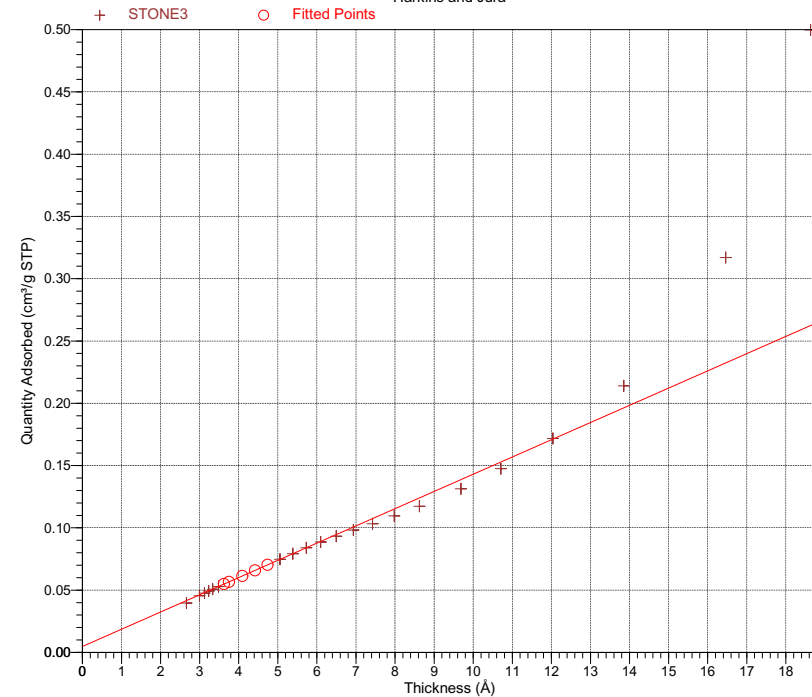
Page 8

Sample: STONE3
 Operator:
 Submitter:
 File: D:\DATA\2020\EVA\STONE3.SMP

Started: 2010-08-18 9:26:17 Analysis Adsorptive: N2
 Completed: 2010-08-18 14:45:14 Analysis Bath Temp.: -195.755 °C
 Report Time: 2010-08-30 13:52:22 Thermal Correction: No
 Sample Mass: 13.6461 g Smoothed Pressures: No
 Warm Free Space: 22.4610 cm³ Measured Cold Free Space: 65.3565 cm³
 Equilibration Interval: 10 s Low Pressure Dose: None
 Automatic Degas: Yes

t-Plot

Harkins and Jura





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Sample: STONE3
 Operator:
 Submitter:
 File: D:\DATA\2020\EVA\STONE3.SMP

Started: 2010-08-18 9:26:17 Analysis Adsorptive: N2
 Completed: 2010-08-18 14:45:14 Analysis Bath Temp.: -195.755 °C
 Report Time: 2010-08-30 13:52:22 Thermal Correction: No
 Sample Mass: 13.6461 g Smoothed Pressures: No
 Warm Free Space: 22.4610 cm³ Measured Cold Free Space: 65.3565 cm³
 Equilibration Interval: 10 s Low Pressure Dose: None
 Automatic Degas: Yes

BJH Adsorption Pore Distribution Report

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

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)
1359.9 - 502.2	600.0	0.000316	0.000316	0.021	0.021
502.2 - 237.5	283.0	0.000181	0.000498	0.026	0.047
237.5 - 153.1	176.8	0.000073	0.000571	0.017	0.063
153.1 - 112.3	126.1	0.000041	0.000612	0.013	0.076
112.3 - 88.4	97.2	0.000027	0.000639	0.011	0.087
88.4 - 68.5	75.7	0.000023	0.000662	0.012	0.099
68.5 - 58.3	62.5	0.000012	0.000674	0.008	0.107
58.3 - 50.5	53.8	0.000009	0.000683	0.007	0.114
50.5 - 44.3	46.9	0.000007	0.000690	0.006	0.120
44.3 - 39.2	41.4	0.000007	0.000698	0.007	0.127
39.2 - 35.0	36.8	0.000007	0.000705	0.008	0.135
35.0 - 31.3	32.9	0.000008	0.000712	0.009	0.145
31.3 - 28.1	29.5	0.000008	0.000721	0.011	0.156
28.1 - 25.2	26.5	0.000008	0.000729	0.012	0.168
25.2 - 22.6	23.8	0.000008	0.000737	0.013	0.181
22.6 - 20.2	21.3	0.000007	0.000744	0.013	0.194
20.2 - 17.9	18.9	0.000007	0.000750	0.014	0.209

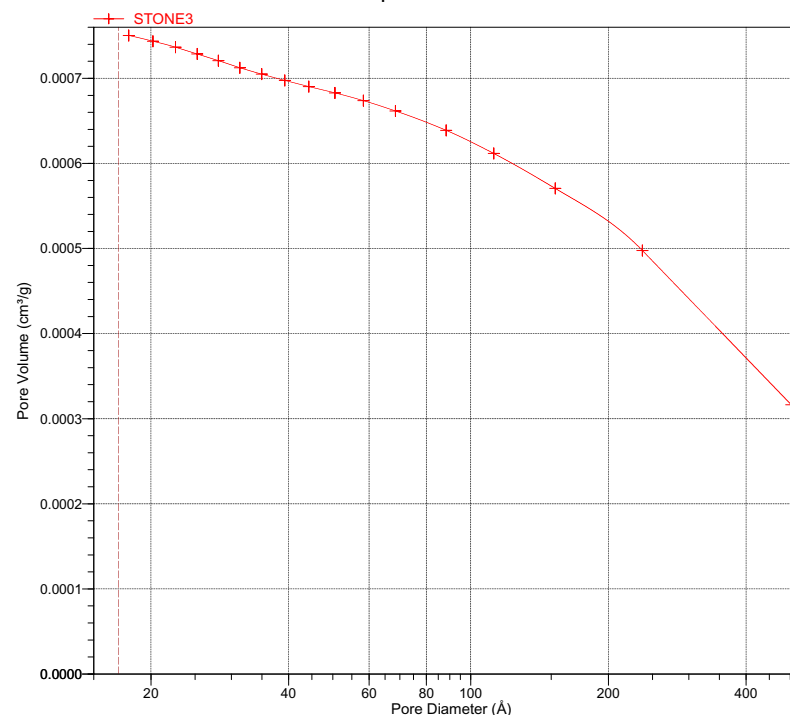


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Sample: STONE3
 Operator:
 Submitter:
 File: D:\DATA\2020\EVA\STONE3.SMP

Started: 2010-08-18 9:26:17 Analysis Adsorptive: N2
 Completed: 2010-08-18 14:45:14 Analysis Bath Temp.: -195.755 °C
 Report Time: 2010-08-30 13:52:22 Thermal Correction: No
 Sample Mass: 13.6461 g Smoothed Pressures: No
 Warm Free Space: 22.4610 cm³ Measured Cold Free Space: 65.3565 cm³
 Equilibration Interval: 10 s Low Pressure Dose: None
 Automatic Degas: Yes

BJH Adsorption Cumulative Pore Volume

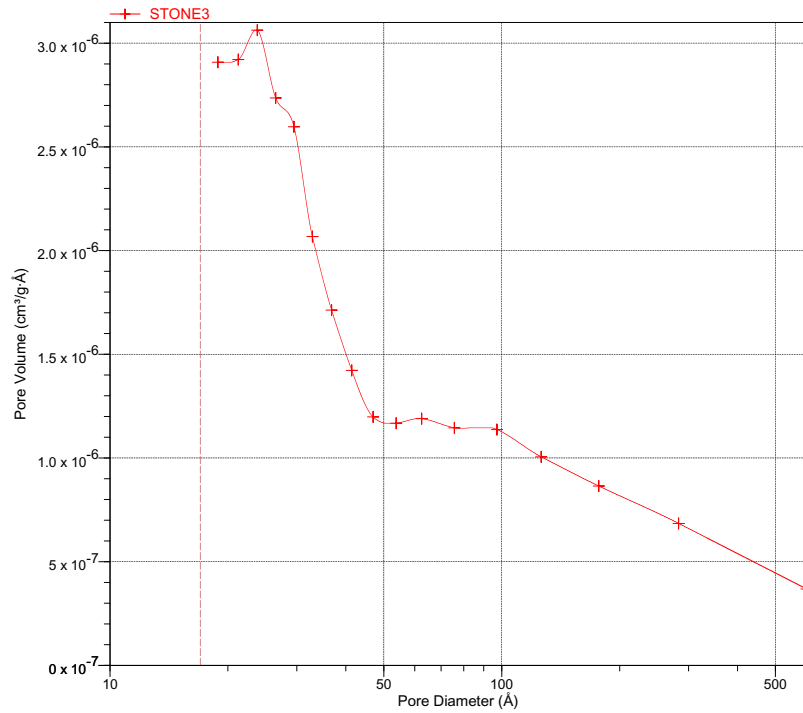




Sample: STONE3
 Operator:
 Submitter:
 File: D:\DATA\2020\EVA\STONE3.SMP

Started: 2010-08-18 9:26:17 Analysis Adsorptive: N2
 Completed: 2010-08-18 14:45:14 Analysis Bath Temp.: -195.755 °C
 Report Time: 2010-08-30 13:52:22 Thermal Correction: No
 Sample Mass: 13.6461 g Smoothed Pressures: No
 Warm Free Space: 22.4610 cm³ Measured Cold Free Space: 65.3565 cm³
 Equilibration Interval: 10 s Low Pressure Dose: None
 Automatic Degas: Yes

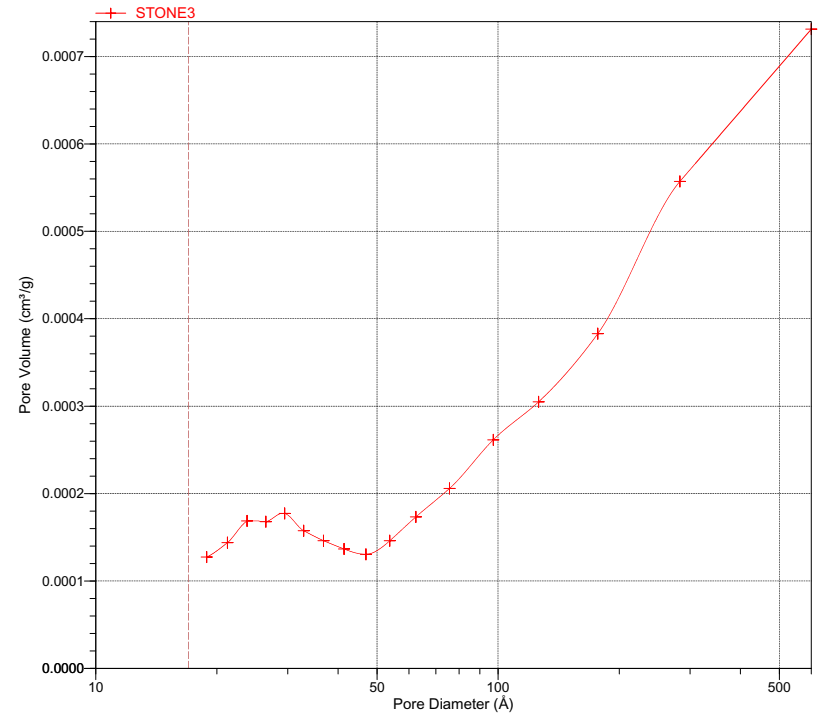
BJH Adsorption dV/dD Pore Volume



Sample: STONE3
 Operator:
 Submitter:
 File: D:\DATA\2020\EVA\STONE3.SMP

Started: 2010-08-18 9:26:17 Analysis Adsorptive: N2
 Completed: 2010-08-18 14:45:14 Analysis Bath Temp.: -195.755 °C
 Report Time: 2010-08-30 13:52:22 Thermal Correction: No
 Sample Mass: 13.6461 g Smoothed Pressures: No
 Warm Free Space: 22.4610 cm³ Measured Cold Free Space: 65.3565 cm³
 Equilibration Interval: 10 s Low Pressure Dose: None
 Automatic Degas: Yes

BJH Adsorption dV/dlog(D) Pore Volume





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Sample: STONE3
 Operator:
 Submitter:
 File: D:\DATA\2020\EVA\STONE3.SMP

Started: 2010-08-18 9:26:17 Analysis Adsorptive: N2
 Completed: 2010-08-18 14:45:14 Analysis Bath Temp.: -195.755 °C
 Report Time: 2010-08-30 13:52:22 Thermal Correction: No
 Sample Mass: 13.6461 g Smoothed Pressures: No
 Warm Free Space: 22.4610 cm³ Measured Cold Free Space: 65.3565 cm³
 Equilibration Interval: 10 s Low Pressure Dose: None
 Automatic Degas: Yes

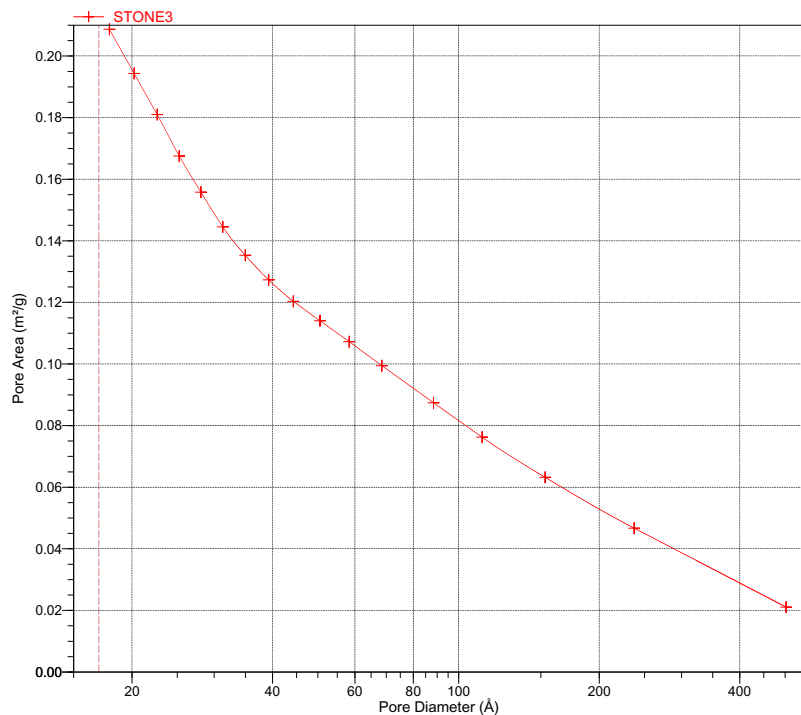


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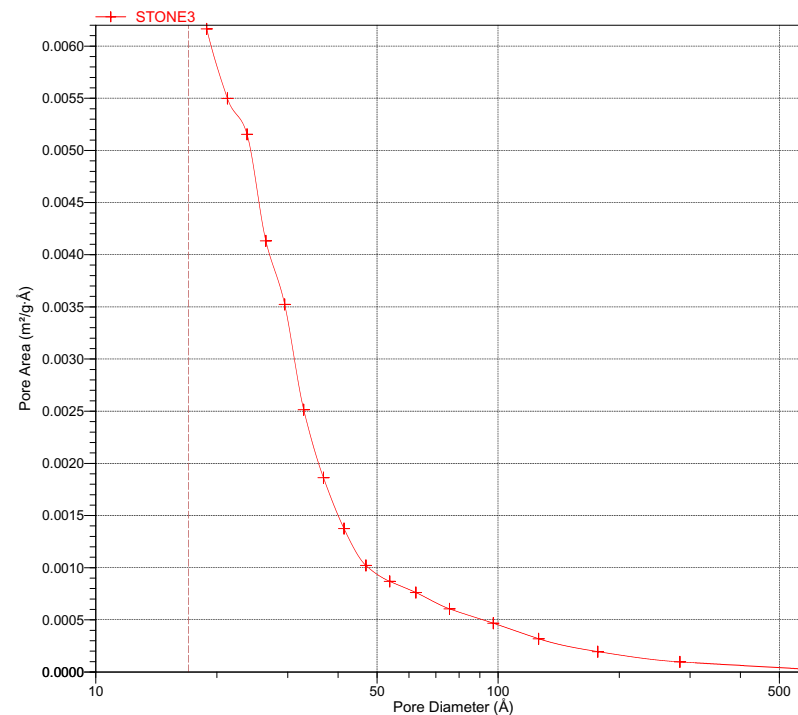
Sample: STONE3
 Operator:
 Submitter:
 File: D:\DATA\2020\EVA\STONE3.SMP

Started: 2010-08-18 9:26:17 Analysis Adsorptive: N2
 Completed: 2010-08-18 14:45:14 Analysis Bath Temp.: -195.755 °C
 Report Time: 2010-08-30 13:52:22 Thermal Correction: No
 Sample Mass: 13.6461 g Smoothed Pressures: No
 Warm Free Space: 22.4610 cm³ Measured Cold Free Space: 65.3565 cm³
 Equilibration Interval: 10 s Low Pressure Dose: None
 Automatic Degas: Yes

BJH Adsorption Cumulative Pore Area



BJH Adsorption dA/dD Pore Area





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Sample: STONE3
 Operator:
 Submitter:
 File: D:\DATA\2020\EVA\STONE3.SMP

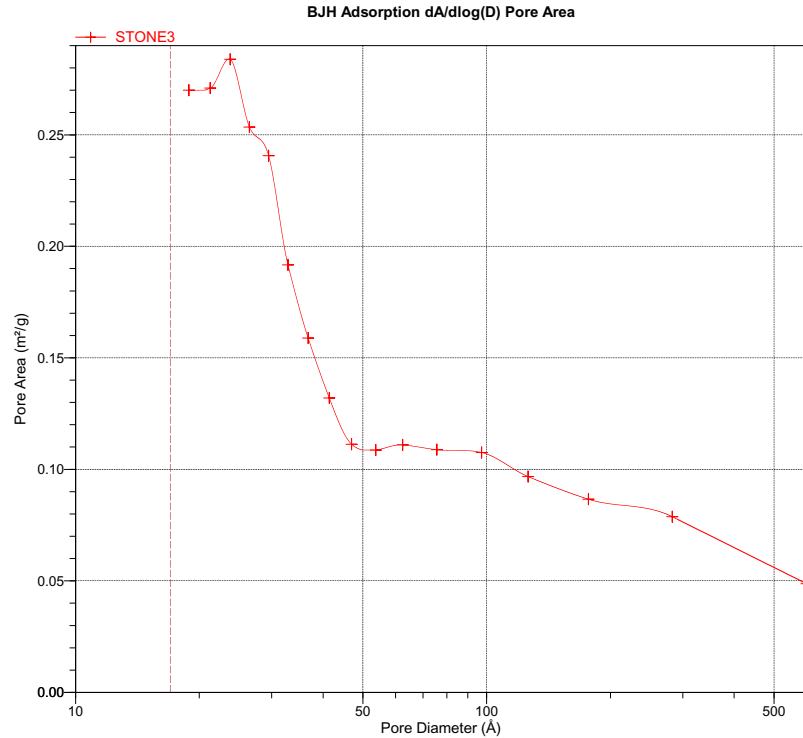
Started: 2010-08-18 9:26:17 Analysis Adsorptive: N2
 Completed: 2010-08-18 14:45:14 Analysis Bath Temp.: -195.755 °C
 Report Time: 2010-08-30 13:52:22 Thermal Correction: No
 Sample Mass: 13.6461 g Smoothed Pressures: No
 Warm Free Space: 22.4610 cm³ Measured Cold Free Space: 65.3565 cm³
 Equilibration Interval: 10 s Low Pressure Dose: None
 Automatic Degas: Yes



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Sample: STONE3
 Operator:
 Submitter:
 File: D:\DATA\2020\EVA\STONE3.SMP

Started: 2010-08-18 9:26:17 Analysis Adsorptive: N2
 Completed: 2010-08-18 14:45:14 Analysis Bath Temp.: -195.755 °C
 Report Time: 2010-08-30 13:52:22 Thermal Correction: No
 Sample Mass: 13.6461 g Smoothed Pressures: No
 Warm Free Space: 22.4610 cm³ Measured Cold Free Space: 65.3565 cm³
 Equilibration Interval: 10 s Low Pressure Dose: None
 Automatic Degas: Yes



Horvath-Kawazoe Report

Slit Pore Geometry (Original H-K)

Maximum Pore Volume: 0.000773 cm³/g
 at Relative Pressure: 0.985584972
 Median Pore Width: 530.494 Å
 Relative Pressure Range: 1.149e-02 to 9.856e-01

Diameter of Adsorptive Molecule: 3.000 Å
 Diameter of Adsorptive at Zero Interaction Energy: 2.574 Å
 Diameter of Sample Atom: 3.040 Å
 Diameter of Sample Atom at Zero Interaction Energy: 2.609 Å
 Interaction Parameter: 3.49e-43 erg·cm⁴

Density Conversion Factor: 0.0015468

Absolute Pressure (mmHg)	Relative Pressure (p/p ⁰)	Quantity Adsorbed (cm ³ /g STP)	Pore Width (Å)	Cumulative Pore Volume (cm ³ /g)	Differential Pore Volume (cm ³ /g·Å)
8.77627	0.011486452	0.0396	10.459	0.0001	0.0000
22.89794	0.029970071	0.0455	12.619	0.0001	0.0000
30.53404	0.039965561	0.0476	13.510	0.0001	0.0000
37.85197	0.049545642	0.0493	14.285	0.0001	0.0000
45.83118	0.059991988	0.0507	15.064	0.0001	0.0000
58.16137	0.076134620	0.0529	16.205	0.0001	0.0000
70.89240	0.092803120	0.0549	17.333	0.0001	0.0000
83.30696	0.109057211	0.0566	18.392	0.0001	0.0000
120.82222	0.158174046	0.0614	21.521	0.0001	0.0000
158.66772	0.207726703	0.0659	24.763	0.0001	0.0000
196.43005	0.257173959	0.0703	28.183	0.0001	0.0000
234.24529	0.306693968	0.0748	31.961	0.0001	0.0000
271.78314	0.355850112	0.0793	36.161	0.0001	0.0000
309.44385	0.405174185	0.0840	40.905	0.0001	0.0000
347.27072	0.454719320	0.0886	46.442	0.0001	0.0000
385.03644	0.504187869	0.0933	52.973	0.0001	0.0000
422.60742	0.553404906	0.0981	60.871	0.0002	0.0000
460.26041	0.602725712	0.1034	70.586	0.0002	0.0000
497.91718	0.652061463	0.1095	83.102	0.0002	0.0000
535.59637	0.701421821	0.1174	99.469	0.0002	0.0000
585.72992	0.767095208	0.1314	132.272	0.0002	0.0000
623.48138	0.816564845	0.1476	172.866	0.0002	0.0000
661.13165	0.865905433	0.1717	241.469	0.0003	0.0000
698.08307	0.914323406	0.2141	388.175	0.0003	0.0000
733.07623	0.960201343	0.3170	857.632	0.0005	0.0000
752.40253	0.985584972	0.4997	2234.708	0.0008	0.0000



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Unit 1

Serial #: 182

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Sample: STONE3
 Operator:
 Submitter:
 File: D:\DATA\2020\EVA\STONE3.SMP

Started: 2010-08-18 9:26:17
 Completed: 2010-08-18 14:45:14
 Report Time: 2010-08-30 13:52:22
 Sample Mass: 13.6461 g
 Warm Free Space: 22.4610 cm³ Measured
 Equilibration Interval: 10 s
 Automatic Degas: Yes

Analysis Adsorptive: N2
 Analysis Bath Temp.: -195.755 °C
 Thermal Correction: No
 Smoothed Pressures: No
 Cold Free Space: 65.3565 cm³
 Low Pressure Dose: None



ASAP 2020 V1.05 H

Unit 1

Serial #: 182

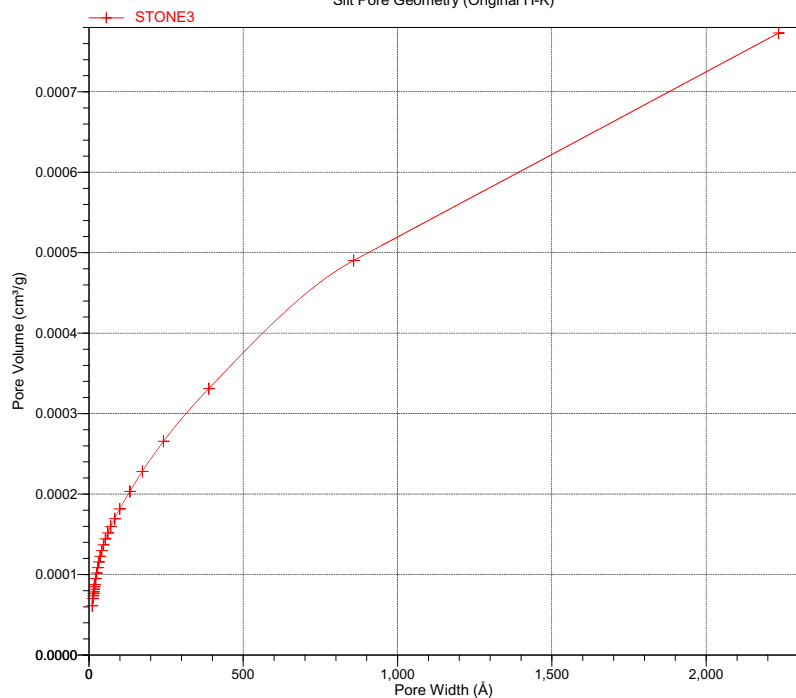
Page 18

Sample: STONE3
 Operator:
 Submitter:
 File: D:\DATA\2020\EVA\STONE3.SMP

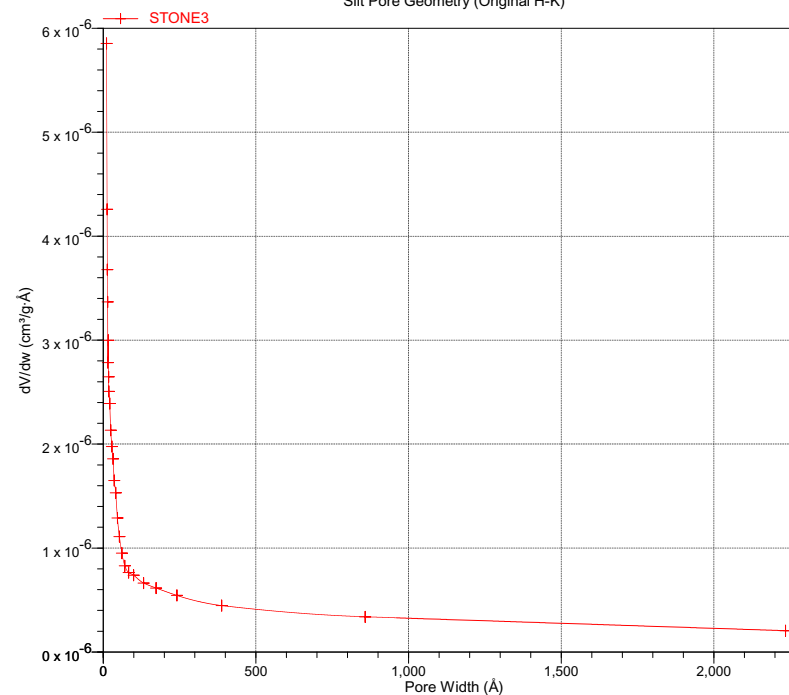
Started: 2010-08-18 9:26:17
 Completed: 2010-08-18 14:45:14
 Report Time: 2010-08-30 13:52:22
 Sample Mass: 13.6461 g
 Warm Free Space: 22.4610 cm³ Measured
 Equilibration Interval: 10 s
 Automatic Degas: Yes

Analysis Adsorptive: N2
 Analysis Bath Temp.: -195.755 °C
 Thermal Correction: No
 Smoothed Pressures: No
 Cold Free Space: 65.3565 cm³
 Low Pressure Dose: None

Horvath-Kawazoe Cumulative Pore Volume Plot
 Slit Pore Geometry (Original H-K)



Horvath-Kawazoe Differential Pore Volume Plot
 Slit Pore Geometry (Original H-K)





ASAP 2020 V1.05 H

Unit 1

Serial #: 182

Page 19

Sample: STONE3
 Operator:
 Submitter:
 File: D:\DATA\2020\EVA\STONE3.SMP

Started: 2010-08-18 9:26:17 Analysis Adsorptive: N2
 Completed: 2010-08-18 14:45:14 Analysis Bath Temp.: -195.755 °C
 Report Time: 2010-08-30 13:52:22 Thermal Correction: No
 Sample Mass: 13.6461 g Smoothed Pressures: No
 Warm Free Space: 22.4610 cm³ Measured Cold Free Space: 65.3565 cm³
 Equilibration Interval: 10 s Low Pressure Dose: None
 Automatic Degas: Yes

Summary Report

Surface Area

Single point surface area at $p/p^* = 0.306693968$: 0.2258 m²/g

BET Surface Area: 0.2271 m²/g

t-Plot Micropore Area: 0.0131 m²/g

t-Plot External Surface Area: 0.2139 m²/g

BJH Adsorption cumulative surface area of pores
 between 17.000 Å and 3000.000 Å diameter: 0.2087 m²/g

BJH Desorption cumulative surface area of pores
 between 17.000 Å and 3000.000 Å diameter: 0.3360 m²/g

Pore Volume

Single point adsorption total pore volume of pores
 less than 1362.2067 Å at $p/p^* = 0.985584972$: 0.000773 cm³/g

t-Plot micropore volume: 0.000007 cm³/g

BJH Adsorption cumulative volume of pores
 between 17.000 Å and 3000.000 Å diameter: 0.000750 cm³/g

BJH Desorption cumulative volume of pores
 between 17.000 Å and 3000.000 Å diameter: 0.000416 cm³/g

Pore Size

Adsorption average pore width (4V/A by BET): 136.1775 Å

BJH Adsorption average pore diameter (4V/A): 143.821 Å

BJH Desorption average pore diameter (4V/A): 49.480 Å

Horvath-Kawazoe

Maximum pore volume at $p/p^* = 0.985584972$: 0.000773 cm³/g

Median pore width: 530.4943 Å

Dubinin-Radushkevich

Micropore surface area: 0.0000 m²/g

Monolayer capacity: 0.000000 cm³/g



ASAP 2020 V1.05 H

Unit 1

Serial #: 182

Page 20

Sample: STONE3
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 File: D:\DATA\2020\EVA\STONE3.SMP

Started: 2010-08-18 9:26:17 Analysis Adsorptive: N2
 Completed: 2010-08-18 14:45:14 Analysis Bath Temp.: -195.755 °C
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 Sample Mass: 13.6461 g Smoothed Pressures: No
 Warm Free Space: 22.4610 cm³ Measured Cold Free Space: 65.3565 cm³
 Equilibration Interval: 10 s Low Pressure Dose: None
 Automatic Degas: Yes

Dubinin-Astakhov

Micropore surface area: 0.2415 m²/g

Limiting micropore volume: 0.000119 cm³/g

MP-Method

Cumulative surface area of pores between
 18.6305 Å and 18.6305 Å hydraulic radius: 0.0000 m²/g

Cumulative pore volume of pores between
 18.6305 Å and 18.6305 Å hydraulic radius: 0.000000 cm³/g

Average pore hydraulic radius (V/A): 0.0000 Å

A2.3 N₂ adsorption isotherms (as referenced to in Section 3.2.1) for the HV sample size fraction 0.5–1 mm (duplicate)



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ASAP 2020 V1.05 H Unit 1 Serial #: 182 Page 2

Sample: S0.5-1
 Operator:
 Submitter:
 File: D:\DATA\2020\EVA\S0.5-1

Sample: S0.5-1
 Operator:
 Submitter:
 File: D:\DATA\2020\EVA\S0.5-1

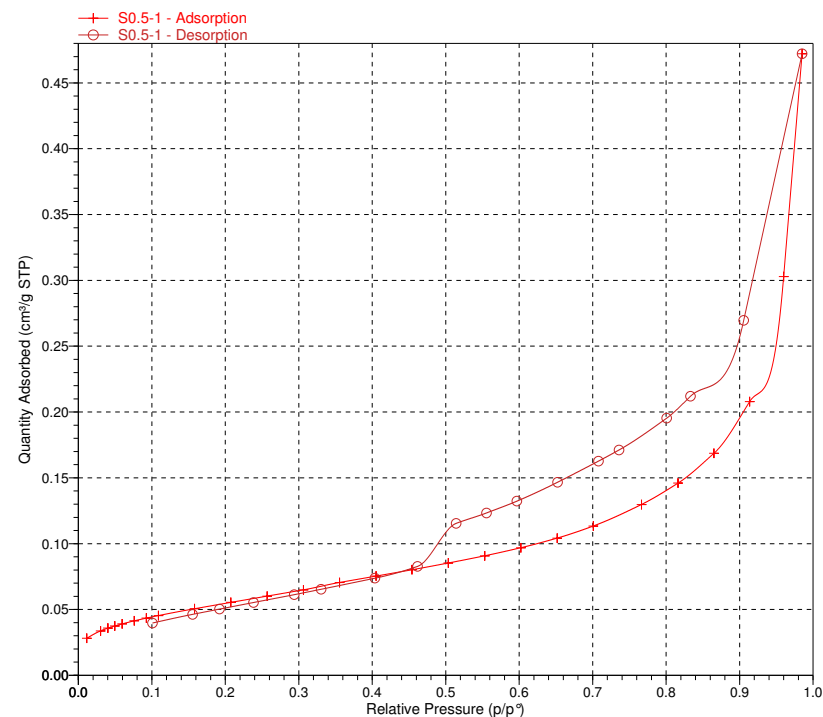
Started: 2010-10-29 11:05:26 Analysis Adsorptive: N2
 Completed: 2010-10-29 15:48:56 Analysis Bath Temp.: -195.721 °C
 Report Time: 2010-11-05 10:51:27 Thermal Correction: No
 Sample Mass: 13.2809 g Smoothed Pressures: No
 Warm Free Space: 22.6921 cm³ Measured Cold Free Space: 66.0676 cm³
 Equilibration Interval: 10 s Low Pressure Dose: None
 Automatic Degas: Yes

Started: 2010-10-29 11:05:26 Analysis Adsorptive: N2
 Completed: 2010-10-29 15:48:56 Analysis Bath Temp.: -195.721 °C
 Report Time: 2010-11-05 10:51:27 Thermal Correction: No
 Sample Mass: 13.2809 g Smoothed Pressures: No
 Warm Free Space: 22.6921 cm³ Measured Cold Free Space: 66.0676 cm³
 Equilibration Interval: 10 s Low Pressure Dose: None
 Automatic Degas: Yes

Isotherm Tabular Report

Relative Pressure (p/p ^o)	Absolute Pressure (mmHg)	Quantity Adsorbed (cm ³ /g STP)	Elapsed Time (h:min)	Saturation Pressure (mmHg)
0.011538826	8.85017	0.0281	01:35	767.13513
0.030415171	23.32790	0.0338	02:29	
0.040180138	30.81713	0.0358	02:32	
0.049625065	38.06088	0.0375	02:35	
0.059589960	45.70316	0.0390	02:37	
0.076049422	45.70316	0.0414	02:40	
0.092580734	58.32631	0.0434	02:42	
0.109025403	71.00430	0.0454	02:46	
0.158093686	83.61558	0.0506	02:49	
0.207531119	121.24699	0.0554	02:51	
0.256945814	159.15988	0.0602	02:55	
0.306404651	197.05565	0.0649	02:57	
0.355579784	234.98392	0.0705	03:00	
0.405270937	272.69382	0.0754	03:03	
0.454235987	310.79974	0.0802	03:05	
0.503653050	348.34830	0.0853	03:07	
0.553074218	386.24026	0.0908	03:11	
0.602291916	424.13580	0.0969	03:14	
0.651659537	461.87613	0.1042	03:16	
0.700889303	499.73090	0.1134	03:18	
0.766458776	537.47754	0.1298	03:21	
0.816137933	587.75543	0.1460	03:23	
0.865203643	625.84729	0.1687	03:25	
0.913663301	663.46588	0.2079	03:28	
0.959946489	700.62140	0.3029	03:30	
0.985047321	736.10486	0.4721	03:33	
	755.33679		03:39	766.79718
0.905676060	694.46985	0.2696	03:41	
0.833174178	638.87561	0.2119	03:44	
0.800687882	613.96521	0.1953	03:47	
0.735849013	564.24695	0.1712	03:49	
0.708044802	542.92676	0.1627	03:53	
0.652396463	500.25577	0.1467	03:55	
0.596801533	457.62573	0.1323	03:58	
0.555485762	425.94492	0.1233	04:00	
0.514142609	394.24310	0.1154	04:03	
0.461814561	354.11810	0.0827	04:05	
0.403565452	309.45285	0.0738	04:09	
0.330431645	253.37405	0.0654	04:12	
0.293784150	225.27286	0.0612	04:15	
0.238302885	182.72998	0.0553	04:17	
0.192203104	147.38080	0.0503	04:20	
0.155605725	119.31803	0.0463	04:23	
0.101042877	77.47939	0.0397	04:26	

Isotherm Linear Plot





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Sample: S0.5-1
 Operator:
 Submitter:
 File: D:\DATA\2020\EVA\S0.5-1

Started: 2010-10-29 11:05:26 Analysis Adsorptive: N2
 Completed: 2010-10-29 15:48:56 Analysis Bath Temp.: -195.721 °C
 Report Time: 2010-11-05 10:51:27 Thermal Correction: No
 Sample Mass: 13.2809 g Smoothed Pressures: No
 Warm Free Space: 22.6921 cm³ Measured Cold Free Space: 66.0676 cm³
 Equilibration Interval: 10 s Low Pressure Dose: None
 Automatic Degas: Yes

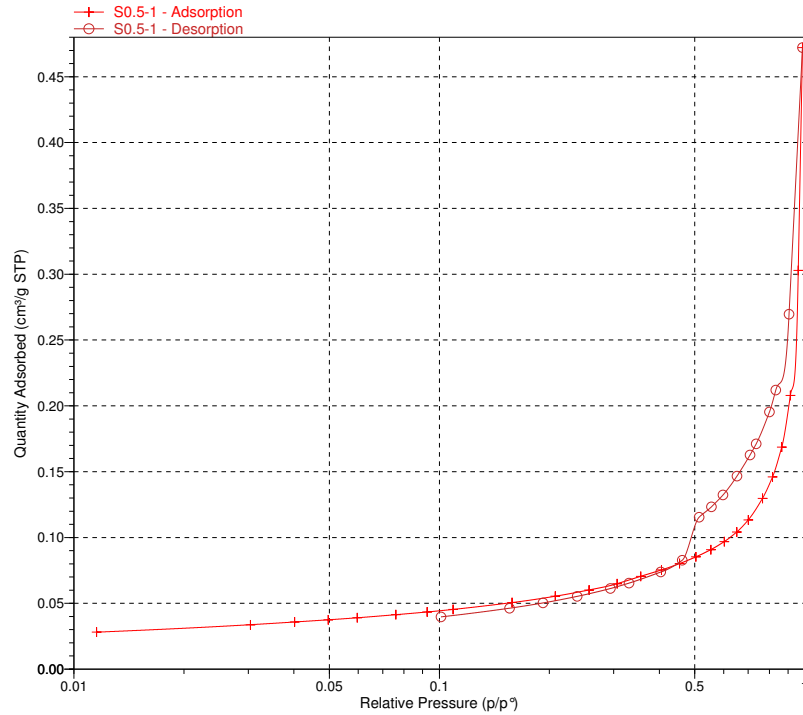


ASAP 2020 V1.05 H Unit 1 Serial #: 182 Page 4

Sample: S0.5-1
 Operator:
 Submitter:
 File: D:\DATA\2020\EVA\S0.5-1

Started: 2010-10-29 11:05:26 Analysis Adsorptive: N2
 Completed: 2010-10-29 15:48:56 Analysis Bath Temp.: -195.721 °C
 Report Time: 2010-11-05 10:51:27 Thermal Correction: No
 Sample Mass: 13.2809 g Smoothed Pressures: No
 Warm Free Space: 22.6921 cm³ Measured Cold Free Space: 66.0676 cm³
 Equilibration Interval: 10 s Low Pressure Dose: None
 Automatic Degas: Yes

Isotherm Log Plot



BET Surface Area Report

BET Surface Area: 0.2047 ± 0.0005 m²/g
 Slope: 20.861679 ± 0.049593 g/cm³ STP
 Y-Intercept: 0.404397 ± 0.010246 g/cm³ STP
 C: 52.587155
 Qm: 0.0470 cm³/g STP
 Correlation Coefficient: 0.9999802
 Molecular Cross-Sectional Area: 0.1620 nm²

Relative Pressure (p/p ⁰)	Quantity Adsorbed (cm ³ /g STP)	1/[Q(p ⁰ p - 1)]
0.059589960	0.0390	1.623571
0.076049422	0.0414	1.989034
0.092580734	0.0434	2.348930
0.109025403	0.0454	2.696404
0.158093686	0.0506	3.713140
0.207531119	0.0554	4.727855
0.256945814	0.0602	5.746940
0.306404651	0.0649	6.804143
0.355579784	0.0705	7.823038



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Sample: S0.5-1
 Operator:
 Submitter:
 File: D:\DATA\2020\EVA\S0.5-1

Started: 2010-10-29 11:05:26	Analysis Adsorptive: N2
Completed: 2010-10-29 15:48:56	Analysis Bath Temp.: -195.721 °C
Report Time: 2010-11-05 10:51:27	Thermal Correction: No
Sample Mass: 13.2809 g	Smoothed Pressures: No
Warm Free Space: 22.6921 cm ³ Measured	Cold Free Space: 66.0676 cm ³
Equilibration Interval: 10 s	Low Pressure Dose: None
Automatic Degas: Yes	

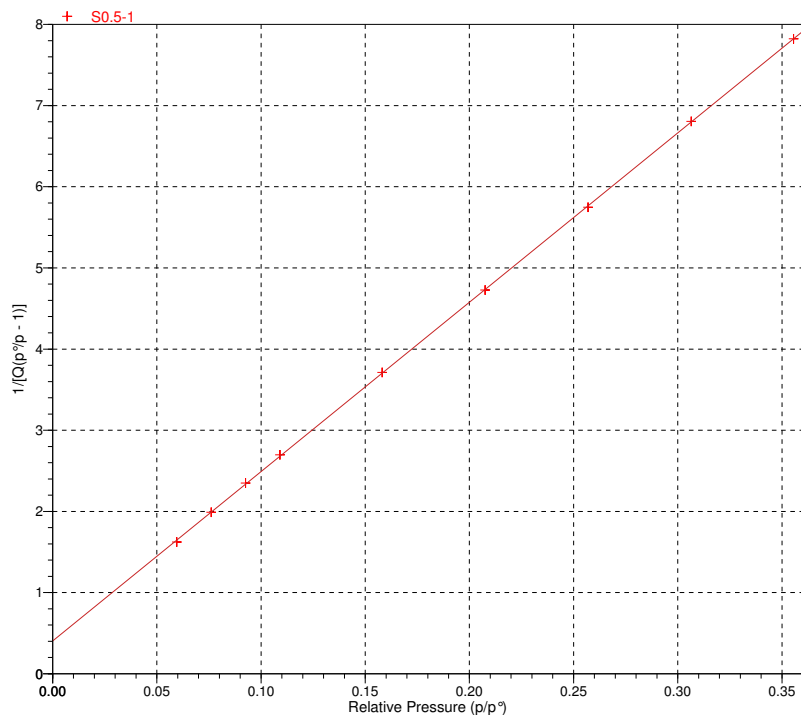


ASAP 2020 V1.05 H Unit 1 Serial #: 182 Page 6

Sample: S0.5-1
 Operator:
 Submitter:
 File: D:\DATA\2020\EVA\S0.5-1

Started: 2010-10-29 11:05:26	Analysis Adsorptive: N2
Completed: 2010-10-29 15:48:56	Analysis Bath Temp.: -195.721 °C
Report Time: 2010-11-05 10:51:27	Thermal Correction: No
Sample Mass: 13.2809 g	Smoothed Pressures: No
Warm Free Space: 22.6921 cm ³ Measured	Cold Free Space: 66.0676 cm ³
Equilibration Interval: 10 s	Low Pressure Dose: None
Automatic Degas: Yes	

BET Surface Area Plot



Langmuir Reports

Primary Data
 4052- Fewer than two points are selected for this report.



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Sample: S0.5-1
Operator:
Submitter:
File: D:\DATA\2020\EVA\S0.5-1

Started: 2010-10-29 11:05:26 Analysis Adsorptive: N2
Completed: 2010-10-29 15:48:56 Analysis Bath Temp.: -195.721 °C
Report Time: 2010-11-05 10:51:27 Thermal Correction: No
Sample Mass: 13.2809 g Smoothed Pressures: No
Warm Free Space: 22.6921 cm³ Measured Cold Free Space: 66.0676 cm³
Equilibration Interval: 10 s Low Pressure Dose: None
Automatic Degas: Yes

t-Plot Report

Micro pore Volume: -0.000017 cm³/g STP
Micro pore Area: *
External Surface Area: 0.2319 m²/g
Slope: 0.014994 ± 0.000029 cm³/g·Å STP
Y-Intercept: -0.010819 ± 0.000119 cm³/g STP
Correlation Coefficient: 0.999994
Surface Area Correction Factor: 1.000
Density Conversion Factor: 0.0015468
Total Surface Area (BET): 0.2047 m²/g
Thickness Range: 3.5000 Å to 5.0000 Å
Thickness Equation: Harkins and Jura
 $t = [13.99 / (0.034 - \log(p/p^*))] ^ 0.5$

Relative Pressure (p/p*)	Statistical Thickness (Å)	Quantity Adsorbed (cm³/g STP)
0.011538826	2.6636	0.0281
0.030415171	3.0034	0.0338
0.040180138	3.1278	0.0358
0.049625065	3.2332	0.0375
0.059589960	3.3337	0.0390
0.076049422	3.4835	0.0414
0.092580734	3.6202	0.0434
0.109025403	3.7469	0.0454
0.158093686	4.0930	0.0506
0.207531119	4.4175	0.0554
0.256945814	4.7344	0.0602
0.306404651	5.0540	0.0649
0.355579784	5.3815	0.0705
0.405270937	5.7289	0.0754
0.454235987	6.0940	0.0802
0.503653050	6.4927	0.0853
0.553074218	6.9311	0.0908
0.602291916	7.4187	0.0969
0.651659537	7.9748	0.1042
0.700889303	8.6184	0.1134
0.766458776	9.6732	0.1298
0.816137933	10.6981	0.1460
0.865203643	12.0168	0.1687
0.913663301	13.8233	0.2079
0.959946489	16.4415	0.3029
0.985047321	18.5760	0.4721

* The micropore area is not reported because either the micropore volume is negative or the calculated external surface area is larger than the total surface area.



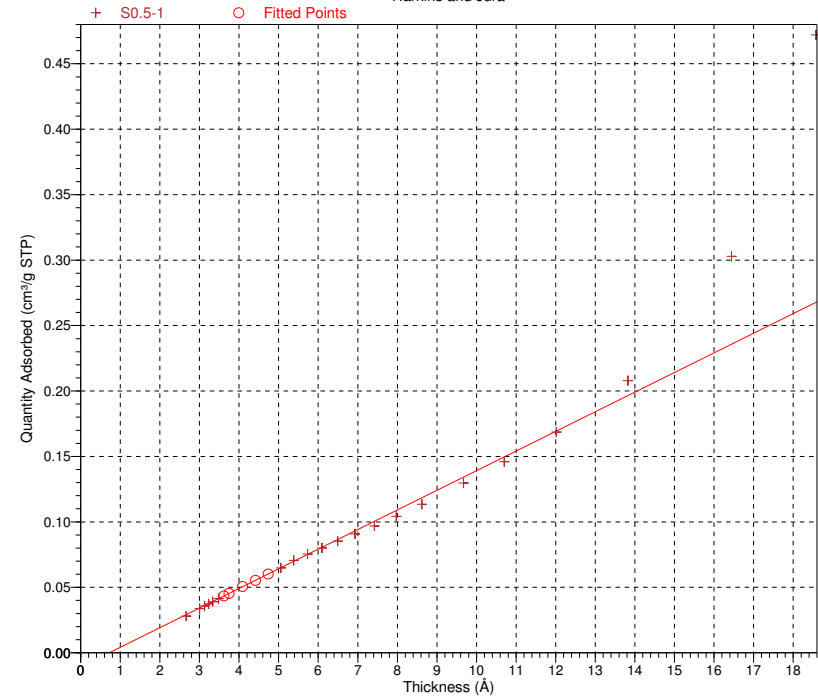
ASAP 2020 V1.05 H Unit 1 Serial #: 182 Page 8

Sample: S0.5-1
Operator:
Submitter:
File: D:\DATA\2020\EVA\S0.5-1

Started: 2010-10-29 11:05:26 Analysis Adsorptive: N2
Completed: 2010-10-29 15:48:56 Analysis Bath Temp.: -195.721 °C
Report Time: 2010-11-05 10:51:27 Thermal Correction: No
Sample Mass: 13.2809 g Smoothed Pressures: No
Warm Free Space: 22.6921 cm³ Measured Cold Free Space: 66.0676 cm³
Equilibration Interval: 10 s Low Pressure Dose: None
Automatic Degas: Yes

t-Plot

Harkins and Jura





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Unit 1

Serial #: 182

Page 9

Sample: S0.5-1
 Operator:
 Submitter:
 File: D:\DATA\2020\EVA\S0.5-1

Started: 2010-10-29 11:05:26
 Completed: 2010-10-29 15:48:56
 Report Time: 2010-11-05 10:51:27
 Sample Mass: 13.2809 g
 Warm Free Space: 22.6921 cm³ Measured
 Equilibration Interval: 10 s
 Automatic Degas: Yes

Analysis Adsorptive: N2
 Analysis Bath Temp.: -195.721 °C
 Thermal Correction: No
 Smoothed Pressures: No
 Cold Free Space: 66.0676 cm³
 Low Pressure Dose: None

Alpha-S Method

Primary Data

At least two fitted data points are needed for alpha-S calculations.



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Unit 1

Serial #: 182

Page 10

Sample: S0.5-1
 Operator:
 Submitter:
 File: D:\DATA\2020\EVA\S0.5-1

Started: 2010-10-29 11:05:26
 Completed: 2010-10-29 15:48:56
 Report Time: 2010-11-05 10:51:27
 Sample Mass: 13.2809 g
 Warm Free Space: 22.6921 cm³ Measured
 Equilibration Interval: 10 s
 Automatic Degas: Yes

Analysis Adsorptive: N2
 Analysis Bath Temp.: -195.721 °C
 Thermal Correction: No
 Smoothed Pressures: No
 Cold Free Space: 66.0676 cm³
 Low Pressure Dose: None

BJH Adsorption Pore Distribution Report

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

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)
1310.2 - 497.5	595.3	0.000291	0.000291	0.020	0.020
497.5 - 234.2	279.3	0.000166	0.000457	0.024	0.043
234.2 - 150.8	174.3	0.000067	0.000524	0.015	0.059
150.8 - 110.5	124.1	0.000038	0.000561	0.012	0.071
110.5 - 86.6	95.4	0.000027	0.000588	0.011	0.082
86.6 - 66.8	74.0	0.000028	0.000616	0.015	0.097
66.8 - 56.7	60.8	0.000015	0.000631	0.010	0.107
56.7 - 48.9	52.1	0.000011	0.000643	0.009	0.116
48.9 - 42.7	45.3	0.000009	0.000652	0.008	0.124
42.7 - 37.6	39.8	0.000008	0.000660	0.008	0.132
37.6 - 33.4	35.2	0.000008	0.000668	0.009	0.141
33.4 - 29.7	31.3	0.000007	0.000675	0.009	0.150
29.7 - 26.5	27.9	0.000007	0.000682	0.011	0.161
26.5 - 23.7	24.9	0.000010	0.000693	0.016	0.177
23.7 - 21.1	22.2	0.000007	0.000700	0.013	0.190
21.1 - 18.6	19.7	0.000007	0.000707	0.014	0.204
18.6 - 16.3	17.3	0.000006	0.000713	0.014	0.218



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Sample: S0.5-1
Operator:
Submitter:
File: D:\DATA\2020\EVA\S0.5-1

Started: 2010-10-29 11:05:26 Analysis Adsorptive: N2
Completed: 2010-10-29 15:48:56 Analysis Bath Temp.: -195.721 °C
Report Time: 2010-11-05 10:51:27 Thermal Correction: No
Sample Mass: 13.2809 g Smoothed Pressures: No
Warm Free Space: 22.6921 cm³ Measured Cold Free Space: 66.0676 cm³
Equilibration Interval: 10 s Low Pressure Dose: None
Automatic Degas: Yes

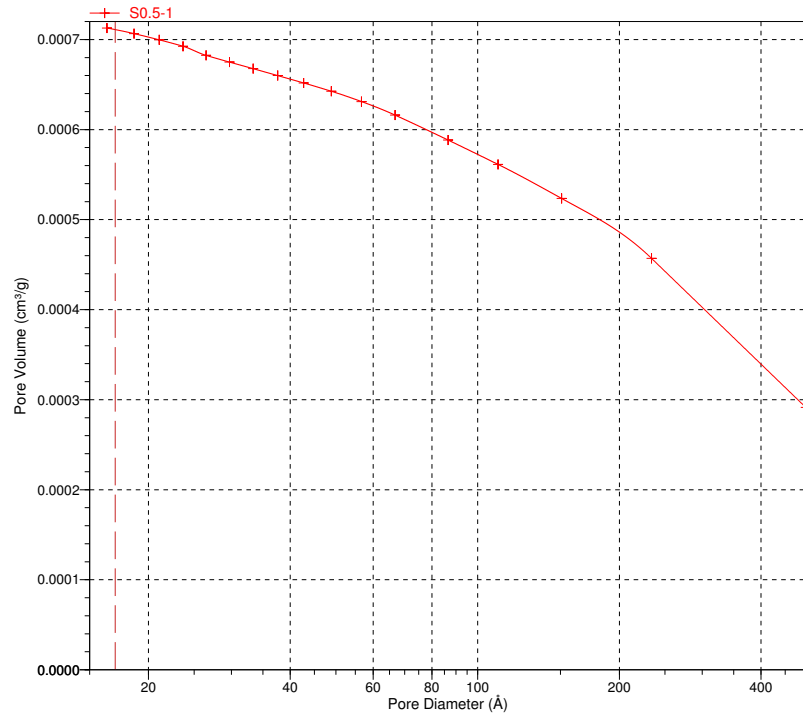


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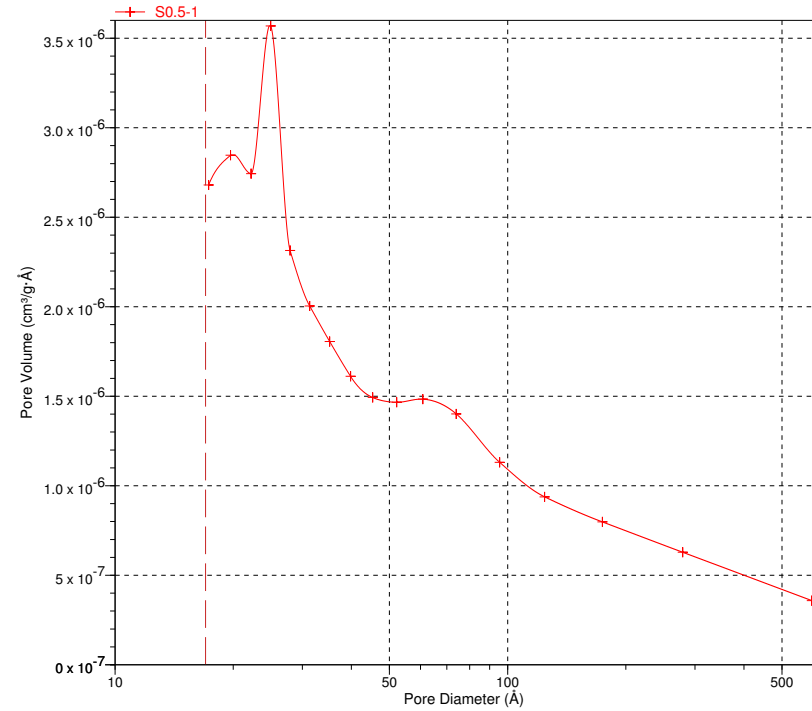
Sample: S0.5-1
Operator:
Submitter:
File: D:\DATA\2020\EVA\S0.5-1

Started: 2010-10-29 11:05:26 Analysis Adsorptive: N2
Completed: 2010-10-29 15:48:56 Analysis Bath Temp.: -195.721 °C
Report Time: 2010-11-05 10:51:27 Thermal Correction: No
Sample Mass: 13.2809 g Smoothed Pressures: No
Warm Free Space: 22.6921 cm³ Measured Cold Free Space: 66.0676 cm³
Equilibration Interval: 10 s Low Pressure Dose: None
Automatic Degas: Yes

BJH Adsorption Cumulative Pore Volume



BJH Adsorption dV/dD Pore Volume





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Sample: S0.5-1
 Operator:
 Submitter:
 File: D:\DATA\2020\EVA\S0.5-1

Started: 2010-10-29 11:05:26 Analysis Adsorptive: N2
 Completed: 2010-10-29 15:48:56 Analysis Bath Temp.: -195.721 °C
 Report Time: 2010-11-05 10:51:27 Thermal Correction: No
 Sample Mass: 13.2809 g Smoothed Pressures: No
 Warm Free Space: 22.6921 cm³ Measured Cold Free Space: 66.0676 cm³
 Equilibration Interval: 10 s Low Pressure Dose: None
 Automatic Degas: Yes

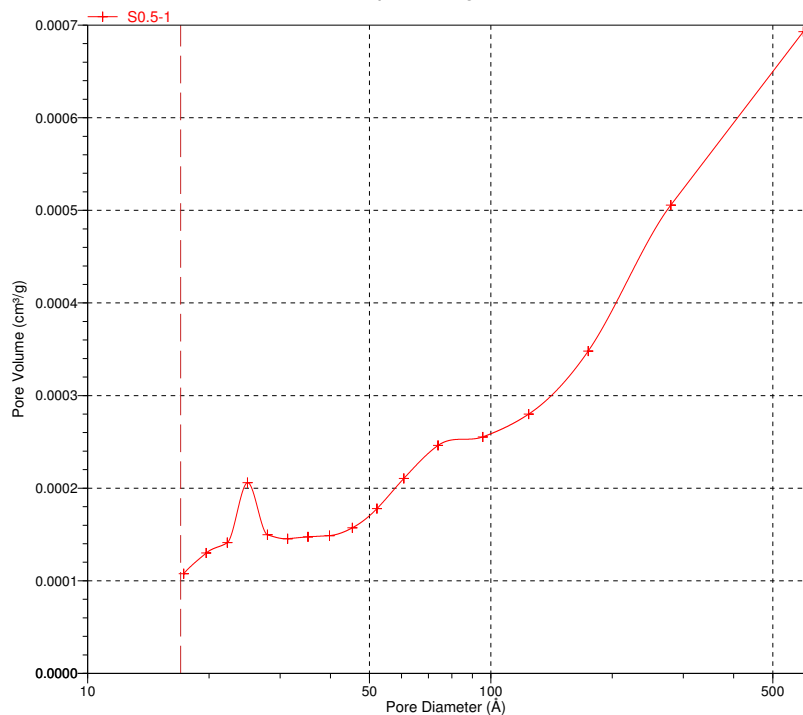


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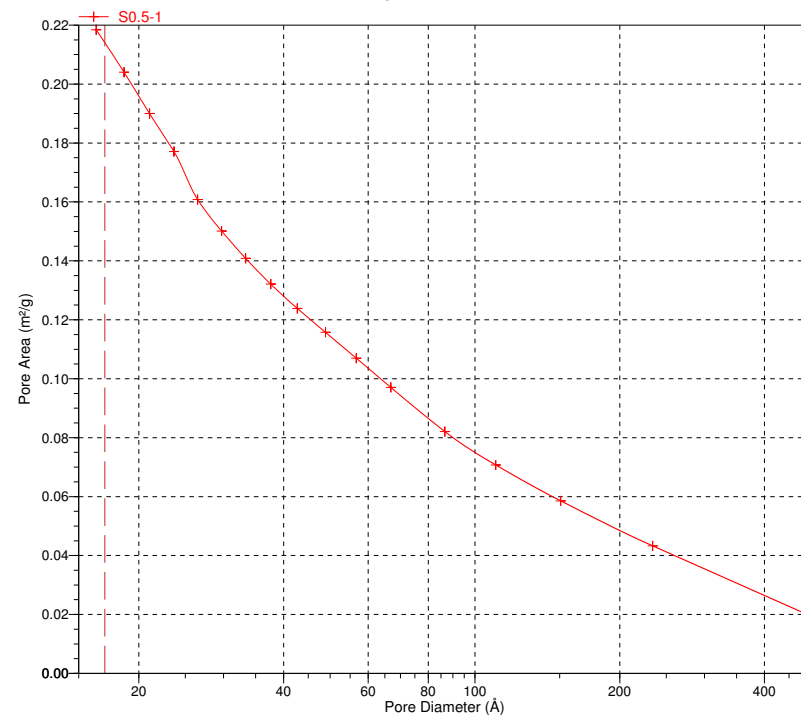
Sample: S0.5-1
 Operator:
 Submitter:
 File: D:\DATA\2020\EVA\S0.5-1

Started: 2010-10-29 11:05:26 Analysis Adsorptive: N2
 Completed: 2010-10-29 15:48:56 Analysis Bath Temp.: -195.721 °C
 Report Time: 2010-11-05 10:51:27 Thermal Correction: No
 Sample Mass: 13.2809 g Smoothed Pressures: No
 Warm Free Space: 22.6921 cm³ Measured Cold Free Space: 66.0676 cm³
 Equilibration Interval: 10 s Low Pressure Dose: None
 Automatic Degas: Yes

BJH Adsorption dV/dlog(D) Pore Volume



BJH Adsorption Cumulative Pore Area



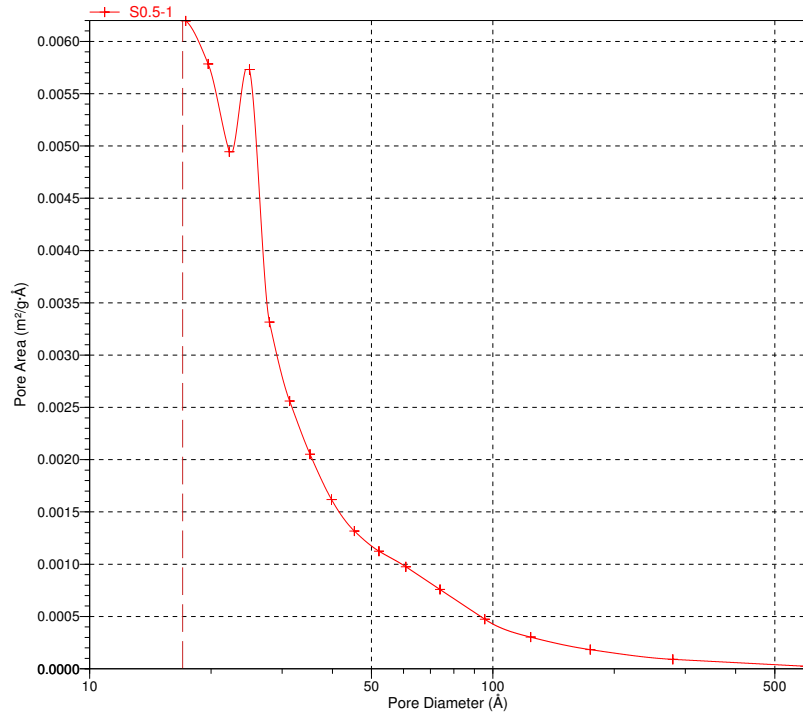


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Sample: S0.5-1
Operator:
Submitter:
File: D:\DATA\2020\EVA\S0.5-1

Started: 2010-10-29 11:05:26 Analysis Adsorptive: N2
Completed: 2010-10-29 15:48:56 Analysis Bath Temp.: -195.721 °C
Report Time: 2010-11-05 10:51:27 Thermal Correction: No
Sample Mass: 13.2809 g Smoothed Pressures: No
Warm Free Space: 22.6921 cm³ Measured Cold Free Space: 66.0676 cm³
Equilibration Interval: 10 s Low Pressure Dose: None
Automatic Degas: Yes

BJH Adsorption dA/dD Pore Area

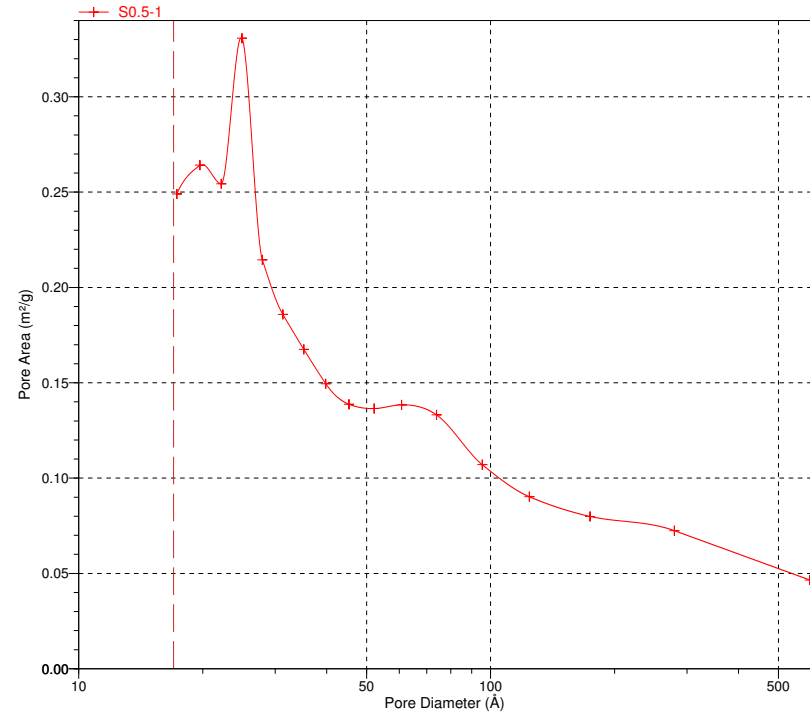


ASAP 2020 V1.05 H Unit 1 Serial #: 182 Page 16

Sample: S0.5-1
Operator:
Submitter:
File: D:\DATA\2020\EVA\S0.5-1

Started: 2010-10-29 11:05:26 Analysis Adsorptive: N2
Completed: 2010-10-29 15:48:56 Analysis Bath Temp.: -195.721 °C
Report Time: 2010-11-05 10:51:27 Thermal Correction: No
Sample Mass: 13.2809 g Smoothed Pressures: No
Warm Free Space: 22.6921 cm³ Measured Cold Free Space: 66.0676 cm³
Equilibration Interval: 10 s Low Pressure Dose: None
Automatic Degas: Yes

BJH Adsorption dA/dlog(D) Pore Area





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Sample: S0.5-1
 Operator:
 Submitter:
 File: D:\DATA\2020\EVA\S0.5-1

Started: 2010-10-29 11:05:26 Analysis Adsorptive: N2
 Completed: 2010-10-29 15:48:56 Analysis Bath Temp.: -195.721 °C
 Report Time: 2010-11-05 10:51:27 Thermal Correction: No
 Sample Mass: 13.2809 g Smoothed Pressures: No
 Warm Free Space: 22.6921 cm³ Measured Cold Free Space: 66.0676 cm³
 Equilibration Interval: 10 s Low Pressure Dose: None
 Automatic Degas: Yes

Horvath-Kawazoe Report

Slit Pore Geometry (Original H-K)

Maximum Pore Volume: 0.000730 cm³/g
 at Relative Pressure: 0.985047321
 Median Pore Width: 502.587 Å
 Relative Pressure Range: 1.154e-02 to 9.850e-01

Diameter of Adsorptive Molecule: 3.000 Å
 Diameter of Adsorptive at Zero Interaction Energy: 2.574 Å
 Diameter of Sample Atom: 3.040 Å
 Diameter of Sample Atom at Zero Interaction Energy: 2.609 Å
 Interaction Parameter: 3.49e-43 erg·cm⁴

Density Conversion Factor: 0.0015468

Absolute Pressure (mmHg)	Relative Pressure (p/p [*])	Quantity Adsorbed (cm ³ /g STP)	Pore Width (Å)	Cumulative Pore Volume (cm ³ /g)	Differential Pore Volume (cm ³ /g·Å)
8.85017	0.011538826	0.0281	10.467	0.0000	0.0000
23.32790	0.030415171	0.0338	12.655	0.0001	0.0000
30.81713	0.040180138	0.0358	13.518	0.0001	0.0000
38.06088	0.049625065	0.0375	14.280	0.0001	0.0000
45.70316	0.059589960	0.0390	15.036	0.0001	0.0000
58.32631	0.076049422	0.0414	16.193	0.0001	0.0000
71.00430	0.092580734	0.0434	17.309	0.0001	0.0000
83.61558	0.109025403	0.0454	18.383	0.0001	0.0000
121.24699	0.158093686	0.0506	21.511	0.0001	0.0000
159.15988	0.207531119	0.0554	24.727	0.0001	0.0000
197.05565	0.256945814	0.0602	28.170	0.0001	0.0000
234.98392	0.306404651	0.0649	31.916	0.0001	0.0000
272.69382	0.35579784	0.0705	36.110	0.0001	0.0000
310.79974	0.405270937	0.0754	40.887	0.0001	0.0000
348.34830	0.454235987	0.0802	46.378	0.0001	0.0000
386.24026	0.503653050	0.0853	52.901	0.0001	0.0000
424.13580	0.553074218	0.0908	60.788	0.0001	0.0000
461.87613	0.602291916	0.0969	70.426	0.0001	0.0000
499.73090	0.651659537	0.1042	82.916	0.0002	0.0000
537.47754	0.700889303	0.1134	99.247	0.0002	0.0000
587.75543	0.766458776	0.1298	131.979	0.0002	0.0000
625.84729	0.816137933	0.1460	171.135	0.0002	0.0000
663.46588	0.865203643	0.1687	240.805	0.0003	0.0000
700.62140	0.913663301	0.2079	384.673	0.0003	0.0000
736.10486	0.959946489	0.3029	849.929	0.0005	0.0000
755.33679	0.985047321	0.4721	2214.680	0.0007	0.0000



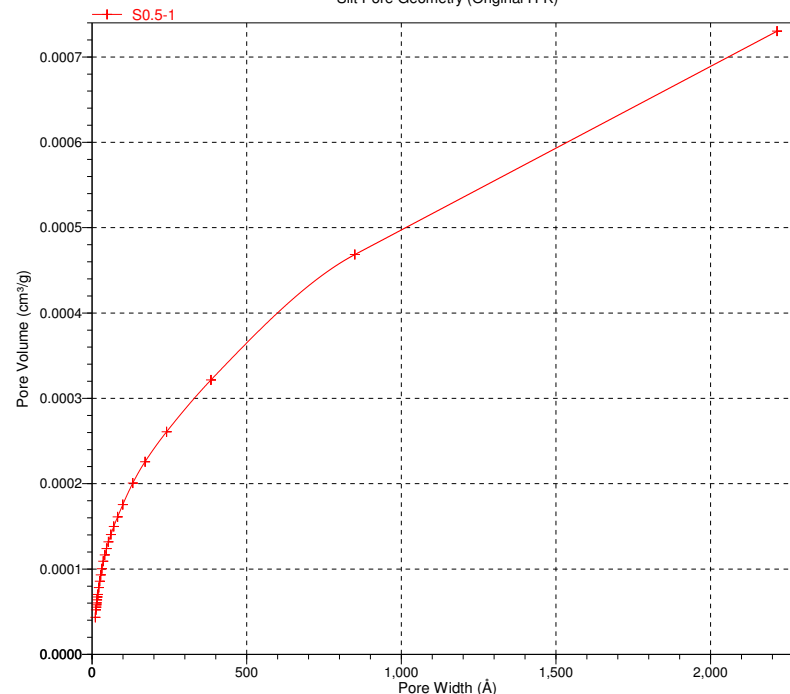
ASAP 2020 V1.05 H Unit 1 Serial #: 182 Page 18

Sample: S0.5-1
 Operator:
 Submitter:
 File: D:\DATA\2020\EVA\S0.5-1

Started: 2010-10-29 11:05:26 Analysis Adsorptive: N2
 Completed: 2010-10-29 15:48:56 Analysis Bath Temp.: -195.721 °C
 Report Time: 2010-11-05 10:51:27 Thermal Correction: No
 Sample Mass: 13.2809 g Smoothed Pressures: No
 Warm Free Space: 22.6921 cm³ Measured Cold Free Space: 66.0676 cm³
 Equilibration Interval: 10 s Low Pressure Dose: None
 Automatic Degas: Yes

Horvath-Kawazoe Cumulative Pore Volume Plot

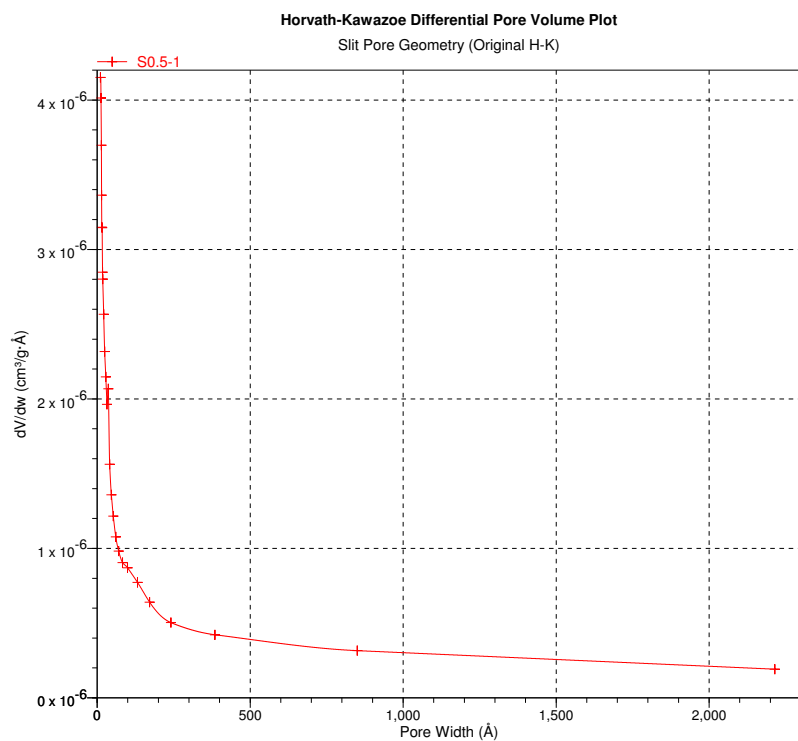
Slit Pore Geometry (Original H-K)



Sample: S0.5-1
 Operator:
 Submitter:
 File: D:\DATA\2020\EVA\S0.5-1

Started: 2010-10-29 11:05:26
 Completed: 2010-10-29 15:48:56
 Report Time: 2010-11-05 10:51:27
 Sample Mass: 13.2809 g
 Warm Free Space: 22.6921 cm³ Measured
 Equilibration Interval: 10 s
 Automatic Degas: Yes

Analysis Adsorptive: N₂
 Analysis Bath Temp.: -195.721 °C
 Thermal Correction: No
 Smoothed Pressures: No
 Cold Free Space: 66.0676 cm³
 Low Pressure Dose: None



Sample: S0.5-1
 Operator:
 Submitter:
 File: D:\DATA\2020\EVA\S0.5-1

Started: 2010-10-29 11:05:26
 Completed: 2010-10-29 15:48:56
 Report Time: 2010-11-05 10:51:27
 Sample Mass: 13.2809 g
 Warm Free Space: 22.6921 cm³ Measured
 Equilibration Interval: 10 s
 Automatic Degas: Yes

Analysis Adsorptive: N₂
 Analysis Bath Temp.: -195.721 °C
 Thermal Correction: No
 Smoothed Pressures: No
 Cold Free Space: 66.0676 cm³
 Low Pressure Dose: None

Summary Report

Surface Area

Single point surface area at $p/p^\circ = 0.306404651$: 0.1960 m²/g

BET Surface Area: 0.2047 m²/g

t-Plot External Surface Area: 0.2319 m²/g

BJH Adsorption cumulative surface area of pores
 between 17.000 \AA and 3000.000 \AA diameter: 0.2184 m²/g

BJH Desorption cumulative surface area of pores
 between 17.000 \AA and 3000.000 \AA diameter: 0.3044 m²/g

Pore Volume

Single point adsorption total pore volume of pores
 less than 1314.0579 \AA at $p/p^\circ = 0.985047321$: 0.000730 cm³/g

t-Plot micropore volume: -0.000017 cm³/g

BJH Adsorption cumulative volume of pores
 between 17.000 \AA and 3000.000 \AA diameter: 0.000713 cm³/g

BJH Desorption cumulative volume of pores
 between 17.000 \AA and 3000.000 \AA diameter: 0.000417 cm³/g

Pore Size

Adsorption average pore width (4V/A by BET): 142.6879 \AA

BJH Adsorption average pore diameter (4V/A): 130.535 \AA

BJH Desorption average pore diameter (4V/A): 54.736 \AA

Horvath-Kawazoe

Maximum pore volume at $p/p^\circ = 0.985047321$: 0.000730 cm³/g

Median pore width: 502.5869 \AA

Dubinin-Radushkevich

Micropore surface area: 0.0000 m²/g

Monolayer capacity: 0.000000 cm³/g

Dubinin-Astakhov

Micropore surface area: 0.1927 m²/g

Limiting micropore volume: 0.000104 cm³/g



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Unit 1

Serial #: 182

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Sample: S0.5-1

Operator:

Submitter:

File: D:\DATA\2020\EVA\S0.5-1

Started: 2010-10-29 11:05:26	Analysis Adsorptive: N2
Completed: 2010-10-29 15:48:56	Analysis Bath Temp.: -195.721 °C
Report Time: 2010-11-05 10:51:27	Thermal Correction: No
Sample Mass: 13.2809 g	Smoothed Pressures: No
Warm Free Space: 22.6921 cm ³ Measured	Cold Free Space: 66.0676 cm ³
Equilibration Interval: 10 s	Low Pressure Dose: None
Automatic Degas: Yes	

Dubinin-Astakhov**MP-Method**

Cumulative surface area of pores between
18.5760 Å and 18.5760 Å hydraulic radius: 0.0000 m²/g

Cumulative pore volume of pores between
18.5760 Å and 18.5760 Å hydraulic radius: 0.000000 cm³/g

Average pore hydraulic radius (V/A): 0.0000 Å

A2.4 N₂ adsorption isotherms (as referenced to in Section 3.2.1) for the HV sample size fraction 1–2 mm



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ASAP 2020 V1.05 H Unit 1 Serial #: 182 Page 2

Sample: STONE1
 Operator:
 Submitter:
 File: D:\DATA\2020\EVA\STONE1.SMP

Sample: STONE1
 Operator:
 Submitter:
 File: D:\DATA\2020\EVA\STONE1.SMP

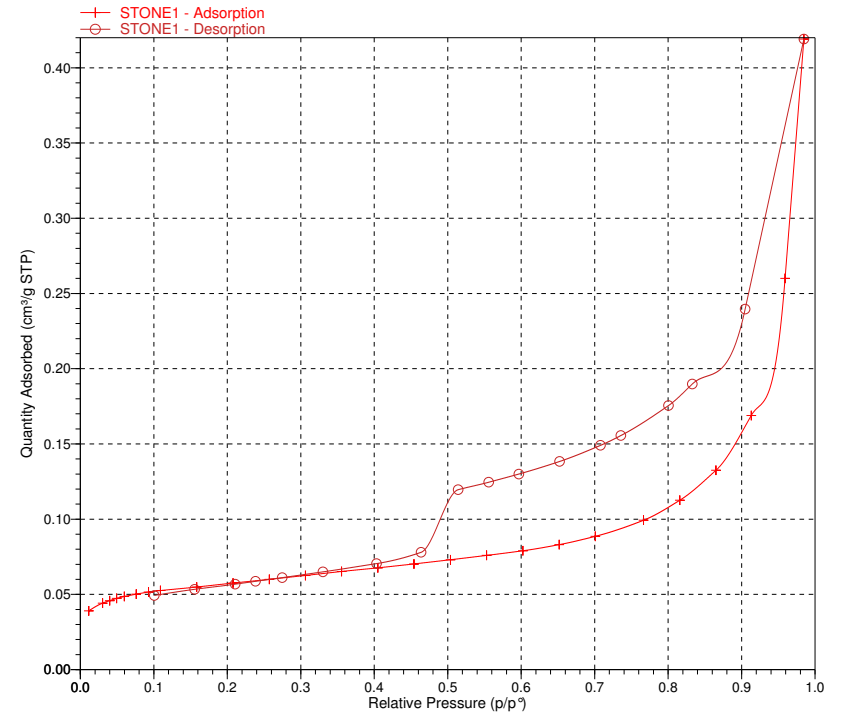
Started: 2010-06-30 9:46:22 Analysis Adsorptive: N2
 Completed: 2010-06-30 17:43:41 Analysis Bath Temp.: -195.696 °C
 Report Time: 2010-11-15 15:11:35 Thermal Correction: No
 Sample Mass: 15.0799 g Smoothed Pressures: No
 Warm Free Space: 22.9868 cm³ Measured Cold Free Space: 69.1966 cm³
 Equilibration Interval: 10 s Low Pressure Dose: None
 Automatic Degas: Yes

Started: 2010-06-30 9:46:22 Analysis Adsorptive: N2
 Completed: 2010-06-30 17:43:41 Analysis Bath Temp.: -195.696 °C
 Report Time: 2010-11-15 15:11:35 Thermal Correction: No
 Sample Mass: 15.0799 g Smoothed Pressures: No
 Warm Free Space: 22.9868 cm³ Measured Cold Free Space: 69.1966 cm³
 Equilibration Interval: 10 s Low Pressure Dose: None
 Automatic Degas: Yes

Isotherm Tabular Report

Relative Pressure (p/p ⁰)	Absolute Pressure (mmHg)	Quantity Adsorbed (cm ³ /g STP)	Elapsed Time (h:min)	Saturation Pressure (mmHg)
0.011479078	8.82922	0.0391	04:30	769.29688
0.030229565	23.25111	0.0442	05:36	
0.039985956	30.75500	0.0459	05:39	
0.049469881	38.04920	0.0473	05:42	
0.059755138	45.95961	0.0486	05:45	
0.076035512	58.48106	0.0502	05:48	
0.092763161	71.34618	0.0516	05:50	
0.109043299	83.86713	0.0526	05:53	
0.158519260	121.91862	0.0549	05:55	
0.207922865	159.91408	0.0575	05:59	
0.257165338	197.78552	0.0600	06:02	
0.306493757	235.72136	0.0626	06:04	
0.355635109	273.51324	0.0652	06:08	
0.405028906	311.49951	0.0677	06:11	
0.454236680	349.34134	0.0703	06:13	
0.503675257	387.36005	0.0730	06:16	
0.553043180	425.32379	0.0759	06:19	
0.602335027	463.22968	0.0790	06:22	
0.651639598	501.14355	0.0831	06:24	
0.701034169	539.12750	0.0886	06:27	
0.766491767	589.46417	0.0993	06:29	
			06:31	
			06:33	769.03754
0.815935287	627.48486	0.1126	06:36	
0.865034840	665.24426	0.1325	06:38	
0.913246371	702.32074	0.1689	06:41	
0.959185188	737.64941	0.2600	06:45	
0.984915925	757.43732	0.4191	06:50	
0.904865677	695.87567	0.2396	06:54	
0.832896836	640.52893	0.1898	06:57	
0.800626370	615.71173	0.1755	06:59	
0.735776388	565.83966	0.1556	07:03	
0.708090398	544.54810	0.1491	07:06	
0.652209448	501.57355	0.1383	07:08	
0.596972074	459.09393	0.1300	07:12	
0.555834204	427.45737	0.1245	07:16	
0.514123909	395.38058	0.1196	07:18	
0.463709664	356.61014	0.0780	07:23	
0.403010624	309.93030	0.0705	07:25	
0.330245468	253.97116	0.0650	07:28	
0.274705155	211.25858	0.0611	07:31	
0.238493827	183.41071	0.0587	07:34	
0.210780259	162.09793	0.0568	07:37	
0.155436336	119.53638	0.0534	07:39	
0.100727229	77.46302	0.0493	07:42	

Isotherm Linear Plot





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Sample: STONE1
 Operator:
 Submitter:
 File: D:\DATA\2020\EVA\STONE1.SMP

Started: 2010-06-30 9:46:22 Analysis Adsorptive: N2
 Completed: 2010-06-30 17:43:41 Analysis Bath Temp.: -195.696 °C
 Report Time: 2010-11-15 15:11:35 Thermal Correction: No
 Sample Mass: 15.0799 g Smoothed Pressures: No
 Warm Free Space: 22.9868 cm³ Measured Cold Free Space: 69.1966 cm³
 Equilibration Interval: 10 s Low Pressure Dose: None
 Automatic Degas: Yes

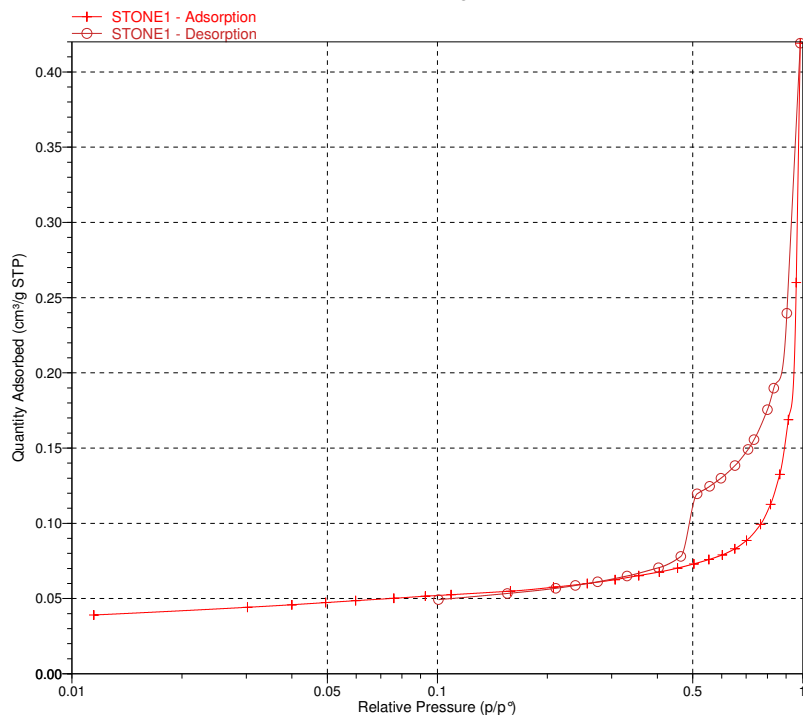


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Sample: STONE1
 Operator:
 Submitter:
 File: D:\DATA\2020\EVA\STONE1.SMP

Started: 2010-06-30 9:46:22 Analysis Adsorptive: N2
 Completed: 2010-06-30 17:43:41 Analysis Bath Temp.: -195.696 °C
 Report Time: 2010-11-15 15:11:35 Thermal Correction: No
 Sample Mass: 15.0799 g Smoothed Pressures: No
 Warm Free Space: 22.9868 cm³ Measured Cold Free Space: 69.1966 cm³
 Equilibration Interval: 10 s Low Pressure Dose: None
 Automatic Degas: Yes

Isotherm Log Plot



BET Surface Area Report

BET Surface Area: 0.1840 ± 0.0034 m²/g
 Slope: 23.906471 ± 0.431722 g/cm³ STP
 Y-Intercept: -0.251497 ± 0.089264 g/cm³ STP
 C: -94.056662
 Qm: 0.0423 cm³/g STP
 Correlation Coefficient: 0.9988605
 Molecular Cross-Sectional Area: 0.1620 nm²

Relative Pressure (p/p°)	Quantity Adsorbed (cm ³ /g STP)	1/[Q(p°p - 1)]
0.059755138	0.0486	1.307885
0.076035512	0.0502	1.640798
0.092763161	0.0516	1.982955
0.109043299	0.0526	2.328772
0.158519260	0.0549	3.431158
0.207922865	0.0575	4.563399
0.257165338	0.0600	5.768231
0.306493757	0.0626	7.061381
0.355635109	0.0652	8.460121



Sample: STONE1
 Operator:
 Submitter:
 File: D:\DATA\2020\EVA\STONE1.SMP

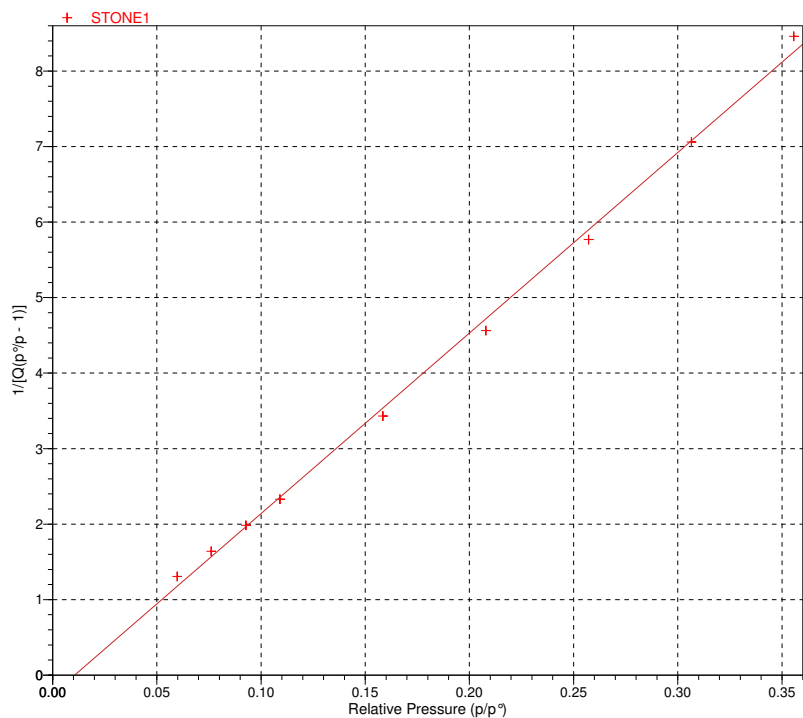
Started: 2010-06-30 9:46:22	Analysis Adsorptive: N2
Completed: 2010-06-30 17:43:41	Analysis Bath Temp.: -195.696 °C
Report Time: 2010-11-15 15:11:35	Thermal Correction: No
Sample Mass: 15.0799 g	Smoothed Pressures: No
Warm Free Space: 22.9868 cm ³ Measured	Cold Free Space: 69.1966 cm ³
Equilibration Interval: 10 s	Low Pressure Dose: None
Automatic Degas: Yes	



Sample: STONE1
 Operator:
 Submitter:
 File: D:\DATA\2020\EVA\STONE1.SMP

Started: 2010-06-30 9:46:22	Analysis Adsorptive: N2
Completed: 2010-06-30 17:43:41	Analysis Bath Temp.: -195.696 °C
Report Time: 2010-11-15 15:11:35	Thermal Correction: No
Sample Mass: 15.0799 g	Smoothed Pressures: No
Warm Free Space: 22.9868 cm ³ Measured	Cold Free Space: 69.1966 cm ³
Equilibration Interval: 10 s	Low Pressure Dose: None
Automatic Degas: Yes	

BET Surface Area Plot



Langmuir Reports

Primary Data
 4052- Fewer than two points are selected for this report.



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Unit 1

Serial #: 182

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Sample: STONE1
 Operator:
 Submitter:
 File: D:\DATA\2020\EVA\STONE1.SMP

Started: 2010-06-30 9:46:22
 Completed: 2010-06-30 17:43:41
 Report Time: 2010-11-15 15:11:35
 Sample Mass: 15.0799 g
 Warm Free Space: 22.9868 cm³ Measured
 Equilibration Interval: 10 s
 Automatic Degas: Yes

Analysis Adsorptive: N₂
 Analysis Bath Temp.: -195.696 °C
 Thermal Correction: No
 Smoothed Pressures: No
 Cold Free Space: 69.1966 cm³
 Low Pressure Dose: None

t-Plot Report

Micropore Volume: 0.000037 cm³/g STP
 Micropore Area: 0.0673 m²/g
 External Surface Area: 0.1167 m²/g
 Slope: 0.007545 ± 0.000148 cm³/g·Å STP
 Y-Intercept: 0.024196 ± 0.000615 cm³/g STP
 Correlation Coefficient: 0.999421
 Surface Area Correction Factor: 1.000
 Density Conversion Factor: 0.0015468
 Total Surface Area (BET): 0.1840 m²/g
 Thickness Range: 3.5000 Å to 5.0000 Å
 Thickness Equation: Harkins and Jura
 $t = [13.99 / (0.034 - \log(p/p^*))] ^{0.5}$

Relative Pressure (p/p*)	Statistical Thickness (Å)	Quantity Adsorbed (cm ³ /g STP)
0.011479078	2.6621	0.0391
0.030229565	3.0008	0.0442
0.039985956	3.1255	0.0459
0.049469881	3.2316	0.0473
0.059755138	3.3353	0.0486
0.076035512	3.4834	0.0502
0.092763161	3.6216	0.0516
0.109043299	3.7471	0.0526
0.158519260	4.0959	0.0549
0.207922865	4.4200	0.0575
0.257165338	4.7358	0.0600
0.306493757	5.0546	0.0626
0.355635109	5.3819	0.0652
0.405028906	5.7272	0.0677
0.454236680	6.0940	0.0703
0.503675257	6.4929	0.0730
0.553043180	6.9308	0.0759
0.602335027	7.4191	0.0790
0.651639598	7.9745	0.0831
0.701034169	8.6204	0.0886
0.766491767	9.6738	0.0993
0.815935287	10.6934	0.1126
0.865034840	12.0115	0.1325
0.913246371	13.8046	0.1689
0.959185188	16.3870	0.2600
0.984915925	18.5627	0.4191



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Unit 1

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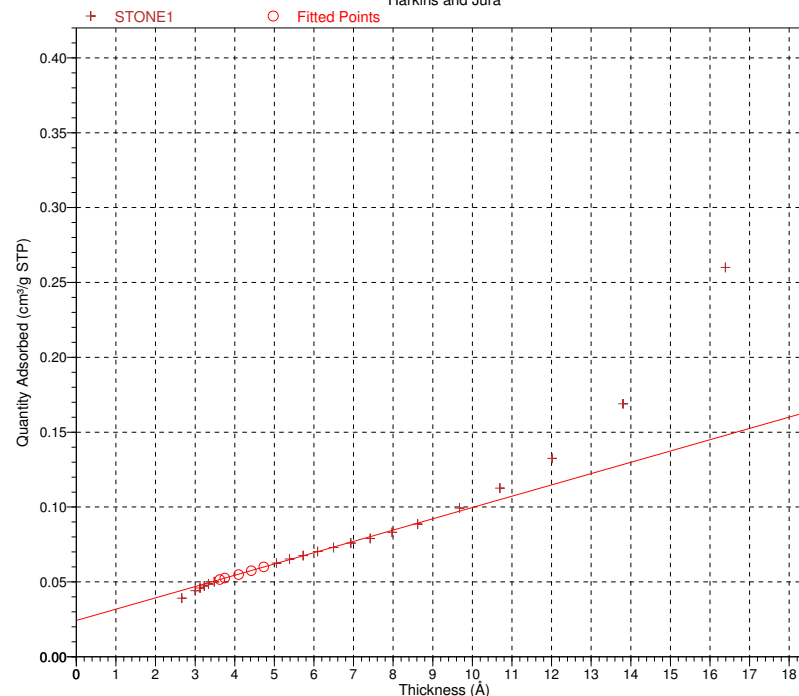
Sample: STONE1
 Operator:
 Submitter:
 File: D:\DATA\2020\EVA\STONE1.SMP

Started: 2010-06-30 9:46:22
 Completed: 2010-06-30 17:43:41
 Report Time: 2010-11-15 15:11:35
 Sample Mass: 15.0799 g
 Warm Free Space: 22.9868 cm³ Measured
 Equilibration Interval: 10 s
 Automatic Degas: Yes

Analysis Adsorptive: N₂
 Analysis Bath Temp.: -195.696 °C
 Thermal Correction: No
 Smoothed Pressures: No
 Cold Free Space: 69.1966 cm³
 Low Pressure Dose: None

t-Plot

Harkins and Jura





Sample: STONE1
 Operator:
 Submitter:
 File: D:\DATA\2020\EVA\STONE1.SMP

Started: 2010-06-30 9:46:22 Analysis Adsorptive: N2
 Completed: 2010-06-30 17:43:41 Analysis Bath Temp.: -195.696 °C
 Report Time: 2010-11-15 15:11:35 Thermal Correction: No
 Sample Mass: 15.0799 g Smoothed Pressures: No
 Warm Free Space: 22.9868 cm³ Measured Cold Free Space: 69.1966 cm³
 Equilibration Interval: 10 s Low Pressure Dose: None
 Automatic Degas: Yes

BJH Adsorption Pore Distribution Report

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

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

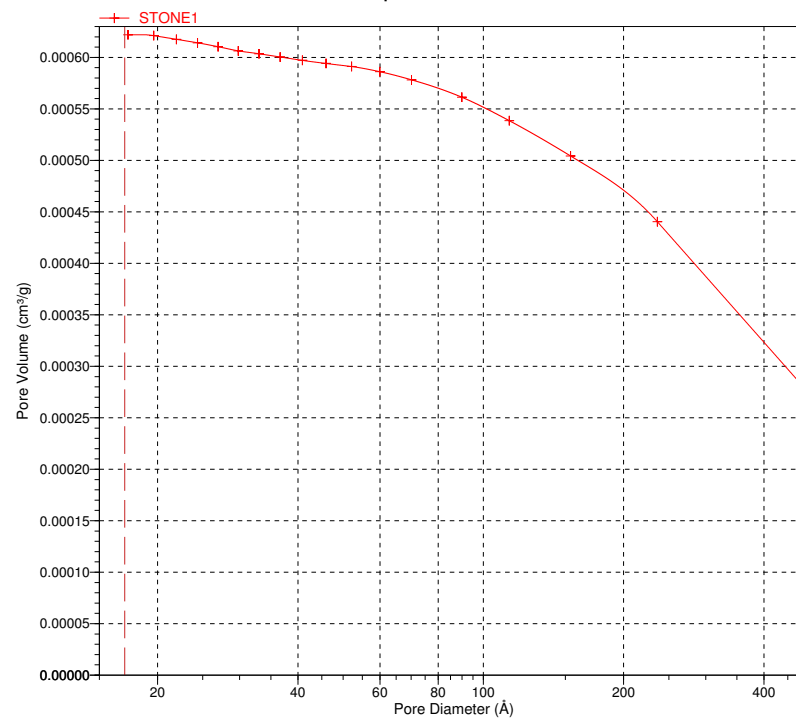
Pore Diameter Range (Å)	Average Diameter (Å)	Incremental Pore Volume (cm³/g)	Cumulative Pore Volume (cm³/g)	Incremental Pore Area (m²/g)	Cumulative Pore Area (m²/g)
1302.2 - 491.7	587.4	0.000278	0.000278	0.019	0.019
491.7 - 236.3	281.1	0.000163	0.000440	0.023	0.042
236.3 - 153.9	177.2	0.000064	0.000504	0.014	0.056
153.9 - 113.7	127.3	0.000034	0.000539	0.011	0.067
113.7 - 89.9	98.7	0.000023	0.000561	0.009	0.076
89.9 - 70.1	77.3	0.000017	0.000578	0.009	0.085
70.1 - 60.0	64.1	0.000008	0.000586	0.005	0.090
60.0 - 52.2	55.4	0.000005	0.000591	0.004	0.094
52.2 - 46.0	48.6	0.000003	0.000594	0.002	0.096
46.0 - 40.9	43.1	0.000003	0.000597	0.003	0.099
40.9 - 36.6	38.5	0.000003	0.000600	0.003	0.102
36.6 - 33.0	34.6	0.000003	0.000604	0.004	0.106
33.0 - 29.8	31.2	0.000003	0.000606	0.004	0.110
29.8 - 27.0	28.2	0.000004	0.000610	0.006	0.115
27.0 - 24.4	25.5	0.000004	0.000614	0.006	0.121
24.4 - 21.9	23.0	0.000003	0.000618	0.006	0.127
21.9 - 19.6	20.6	0.000004	0.000621	0.007	0.134
19.6 - 17.3	18.2	0.000001	0.000622	0.002	0.136



Sample: STONE1
 Operator:
 Submitter:
 File: D:\DATA\2020\EVA\STONE1.SMP

Started: 2010-06-30 9:46:22 Analysis Adsorptive: N2
 Completed: 2010-06-30 17:43:41 Analysis Bath Temp.: -195.696 °C
 Report Time: 2010-11-15 15:11:35 Thermal Correction: No
 Sample Mass: 15.0799 g Smoothed Pressures: No
 Warm Free Space: 22.9868 cm³ Measured Cold Free Space: 69.1966 cm³
 Equilibration Interval: 10 s Low Pressure Dose: None
 Automatic Degas: Yes

BJH Adsorption Cumulative Pore Volume





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Sample: STONE1
 Operator:
 Submitter:
 File: D:\DATA\2020\EVA\STONE1.SMP

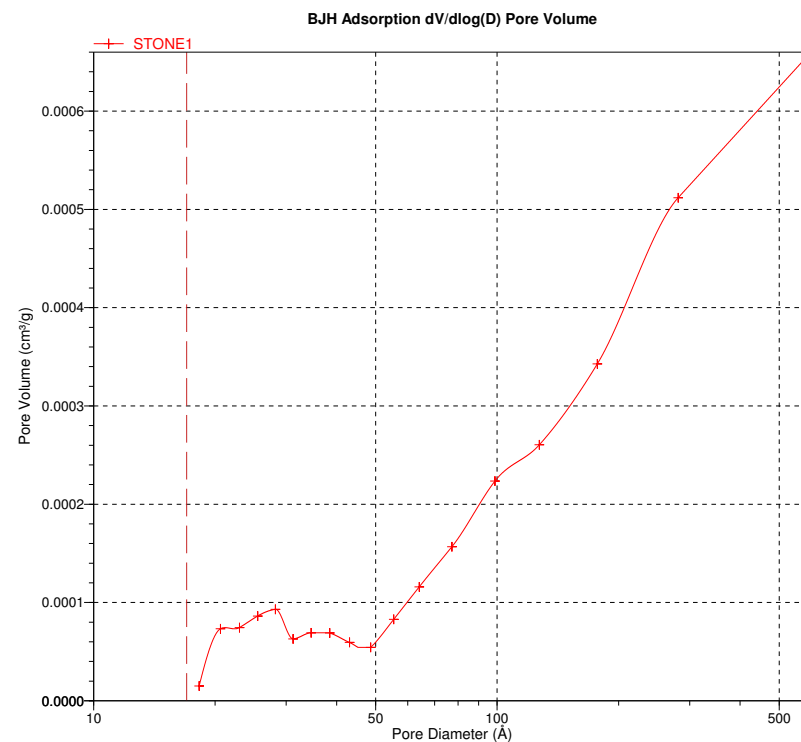
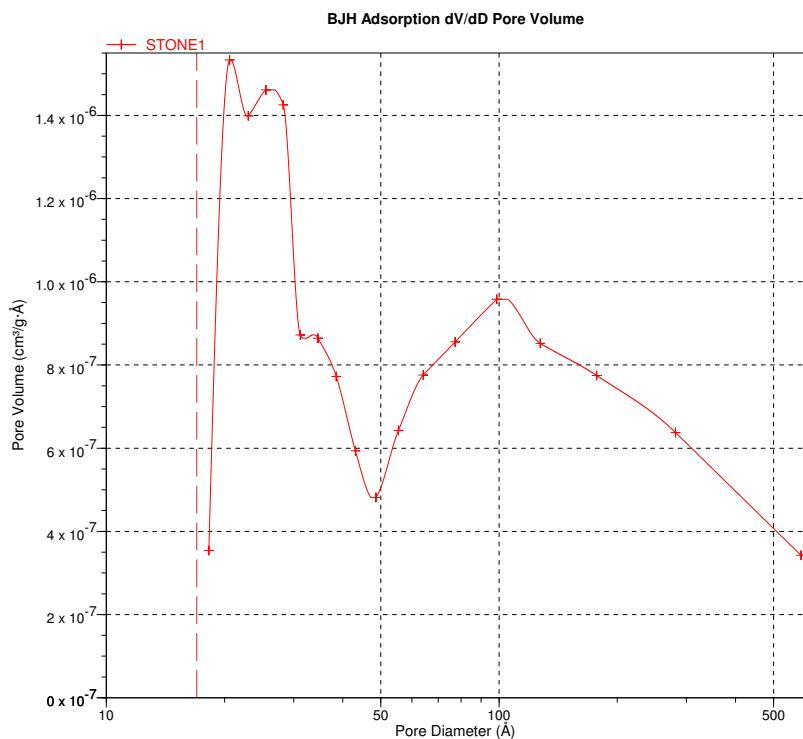
Started: 2010-06-30 9:46:22 Analysis Adsorptive: N2
 Completed: 2010-06-30 17:43:41 Analysis Bath Temp.: -195.696 °C
 Report Time: 2010-11-15 15:11:35 Thermal Correction: No
 Sample Mass: 15.0799 g Smoothed Pressures: No
 Warm Free Space: 22.9868 cm³ Measured Cold Free Space: 69.1966 cm³
 Equilibration Interval: 10 s Low Pressure Dose: None
 Automatic Degas: Yes



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Sample: STONE1
 Operator:
 Submitter:
 File: D:\DATA\2020\EVA\STONE1.SMP

Started: 2010-06-30 9:46:22 Analysis Adsorptive: N2
 Completed: 2010-06-30 17:43:41 Analysis Bath Temp.: -195.696 °C
 Report Time: 2010-11-15 15:11:35 Thermal Correction: No
 Sample Mass: 15.0799 g Smoothed Pressures: No
 Warm Free Space: 22.9868 cm³ Measured Cold Free Space: 69.1966 cm³
 Equilibration Interval: 10 s Low Pressure Dose: None
 Automatic Degas: Yes





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Unit 1

Serial #: 182

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Sample: STONE1
 Operator:
 Submitter:
 File: D:\DATA\2020\EVA\STONE1.SMP

Started: 2010-06-30 9:46:22
 Completed: 2010-06-30 17:43:41
 Report Time: 2010-11-15 15:11:35
 Sample Mass: 15.0799 g
 Warm Free Space: 22.9868 cm³ Measured
 Equilibration Interval: 10 s
 Automatic Degas: Yes

Analysis Adsorptive: N2
 Analysis Bath Temp.: -195.696 °C
 Thermal Correction: No
 Smoothed Pressures: No
 Cold Free Space: 69.1966 cm³
 Low Pressure Dose: None



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Unit 1

Serial #: 182

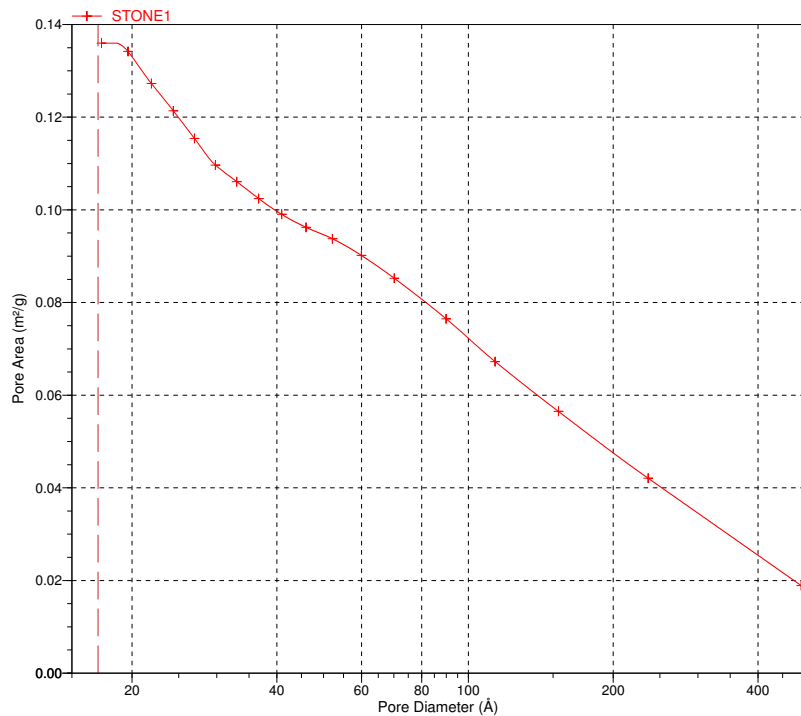
Page 14

Sample: STONE1
 Operator:
 Submitter:
 File: D:\DATA\2020\EVA\STONE1.SMP

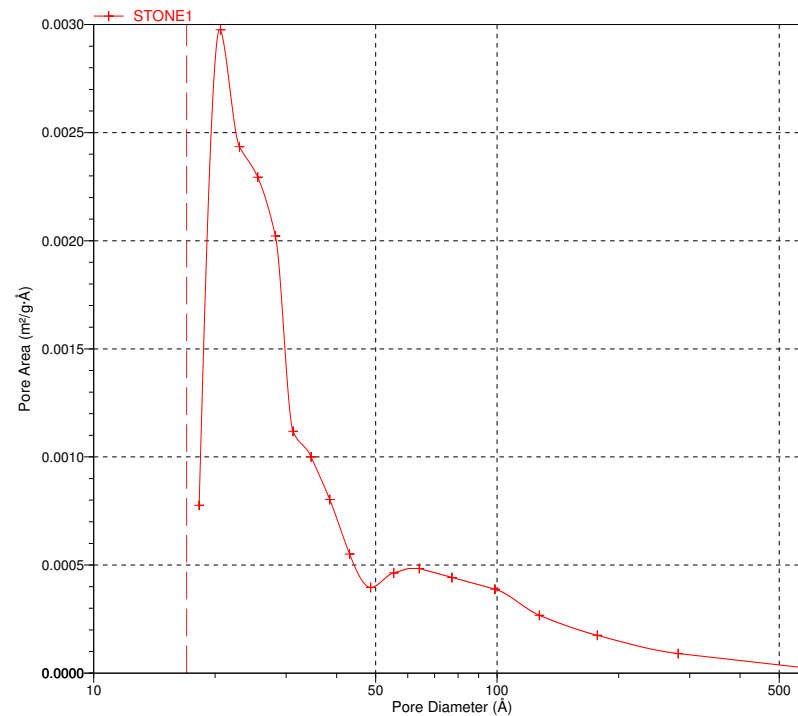
Started: 2010-06-30 9:46:22
 Completed: 2010-06-30 17:43:41
 Report Time: 2010-11-15 15:11:35
 Sample Mass: 15.0799 g
 Warm Free Space: 22.9868 cm³ Measured
 Equilibration Interval: 10 s
 Automatic Degas: Yes

Analysis Adsorptive: N2
 Analysis Bath Temp.: -195.696 °C
 Thermal Correction: No
 Smoothed Pressures: No
 Cold Free Space: 69.1966 cm³
 Low Pressure Dose: None

BJH Adsorption Cumulative Pore Area



BJH Adsorption dA/dD Pore Area





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Sample: STONE1
 Operator:
 Submitter:
 File: D:\DATA\2020\EVA\STONE1.SMP

Started: 2010-06-30 9:46:22 Analysis Adsorptive: N2
 Completed: 2010-06-30 17:43:41 Analysis Bath Temp.: -195.696 °C
 Report Time: 2010-11-15 15:11:35 Thermal Correction: No
 Sample Mass: 15.0799 g Smoothed Pressures: No
 Warm Free Space: 22.9868 cm³ Measured Cold Free Space: 69.1966 cm³
 Equilibration Interval: 10 s Low Pressure Dose: None
 Automatic Degas: Yes

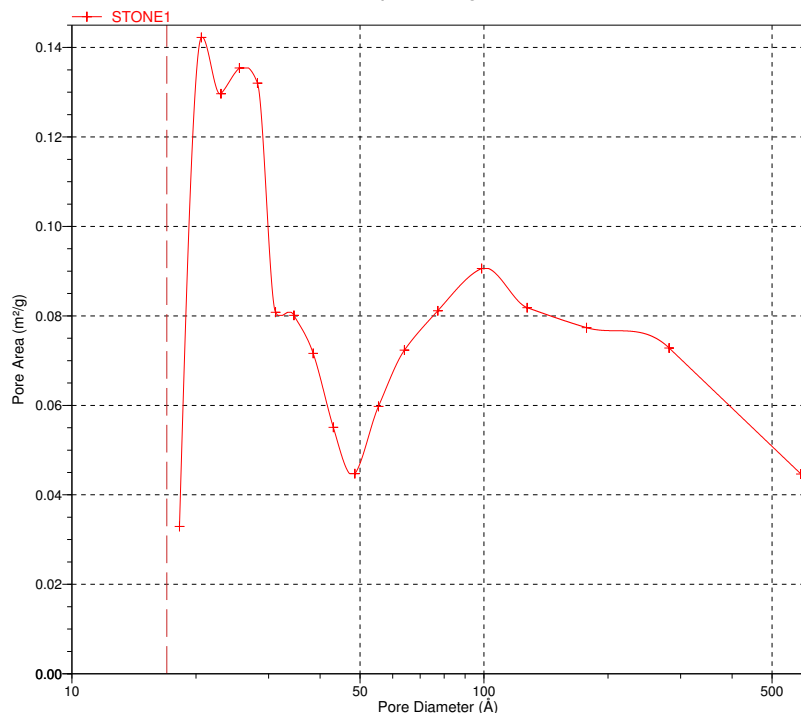


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Sample: STONE1
 Operator:
 Submitter:
 File: D:\DATA\2020\EVA\STONE1.SMP

Started: 2010-06-30 9:46:22 Analysis Adsorptive: N2
 Completed: 2010-06-30 17:43:41 Analysis Bath Temp.: -195.696 °C
 Report Time: 2010-11-15 15:11:35 Thermal Correction: No
 Sample Mass: 15.0799 g Smoothed Pressures: No
 Warm Free Space: 22.9868 cm³ Measured Cold Free Space: 69.1966 cm³
 Equilibration Interval: 10 s Low Pressure Dose: None
 Automatic Degas: Yes

BJH Adsorption dA/dlog(D) Pore Area



Horvath-Kawazoe Report

Slit Pore Geometry (Original H-K)
 Maximum Pore Volume: 0.000648 cm³/g
 at Relative Pressure: 0.984915925
 Median Pore Width: 558.143 Å
 Relative Pressure Range: 1.148e-02 to 9.849e-01
 Diameter of Adsorptive Molecule: 3.000 Å
 Diameter of Adsorptive at Zero Interaction Energy: 2.574 Å
 Diameter of Sample Atom: 3.040 Å
 Diameter of Sample Atom at Zero Interaction Energy: 2.609 Å
 Interaction Parameter: 3.49e-43 erg·cm⁴

Density Conversion Factor: 0.0015468

Absolute Pressure (mmHg)	Relative Pressure (p/p ^o)	Quantity Adsorbed (cm ³ /g STP)	Pore Width (Å)	Cumulative Pore Volume (cm ³ /g)	Differential Pore Volume (cm ³ /g-Å)
8.82922	0.011479078	0.0391	10.455	0.0001	0.0000
23.25111	0.030229565	0.0442	12.636	0.0001	0.0000
30.75500	0.039985956	0.0459	13.498	0.0001	0.0000
38.04920	0.049469881	0.0473	14.270	0.0001	0.0000
45.95961	0.059755138	0.0486	15.046	0.0001	0.0000
58.48106	0.076035512	0.0502	16.196	0.0001	0.0000
71.34618	0.092763161	0.0516	17.312	0.0001	0.0000
83.86713	0.109043299	0.0526	18.370	0.0001	0.0000
121.91862	0.158519260	0.0549	21.538	0.0001	0.0000
159.91408	0.207922865	0.0575	24.758	0.0001	0.0000
197.78552	0.257165338	0.0600	28.177	0.0001	0.0000
235.72136	0.306493757	0.0626	31.924	0.0001	0.0000
273.51324	0.355635109	0.0652	36.119	0.0001	0.0000
311.49951	0.405028906	0.0677	40.857	0.0001	0.0000
349.34134	0.454236680	0.0703	46.345	0.0001	0.0000
387.36005	0.503675257	0.0730	52.863	0.0001	0.0000
425.32379	0.553043180	0.0759	60.746	0.0001	0.0000
463.22968	0.602335027	0.0790	70.441	0.0001	0.0000
501.14355	0.651639598	0.0831	82.933	0.0001	0.0000
539.12750	0.701034169	0.0886	99.268	0.0001	0.0000
589.46417	0.766491767	0.0993	132.006	0.0002	0.0000
627.48486	0.815935287	0.1126	171.170	0.0002	0.0000
665.24426	0.865034840	0.1325	239.111	0.0002	0.0000
702.32074	0.913246371	0.1689	384.402	0.0003	0.0000
737.64941	0.959185188	0.2600	810.589	0.0004	0.0000
757.43732	0.984915925	0.4191	2193.758	0.0006	0.0000



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Unit 1

Serial #: 182

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Sample: STONE1
 Operator:
 Submitter:
 File: D:\DATA\2020\EVA\STONE1.SMP

Started: 2010-06-30 9:46:22
 Completed: 2010-06-30 17:43:41
 Report Time: 2010-11-15 15:11:35
 Sample Mass: 15.0799 g
 Warm Free Space: 22.9868 cm³ Measured
 Equilibration Interval: 10 s
 Automatic Degas: Yes

Analysis Adsorptive: N2
 Analysis Bath Temp.: -195.696 °C
 Thermal Correction: No
 Smoothed Pressures: No
 Cold Free Space: 69.1966 cm³
 Low Pressure Dose: None



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Unit 1

Serial #: 182

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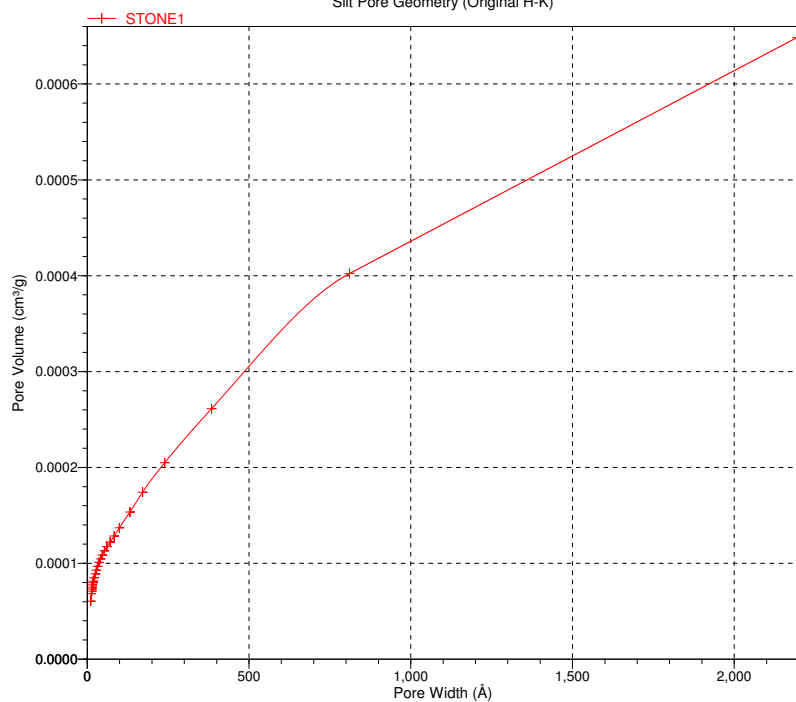
Sample: STONE1
 Operator:
 Submitter:
 File: D:\DATA\2020\EVA\STONE1.SMP

Started: 2010-06-30 9:46:22
 Completed: 2010-06-30 17:43:41
 Report Time: 2010-11-15 15:11:35
 Sample Mass: 15.0799 g
 Warm Free Space: 22.9868 cm³ Measured
 Equilibration Interval: 10 s
 Automatic Degas: Yes

Analysis Adsorptive: N2
 Analysis Bath Temp.: -195.696 °C
 Thermal Correction: No
 Smoothed Pressures: No
 Cold Free Space: 69.1966 cm³
 Low Pressure Dose: None

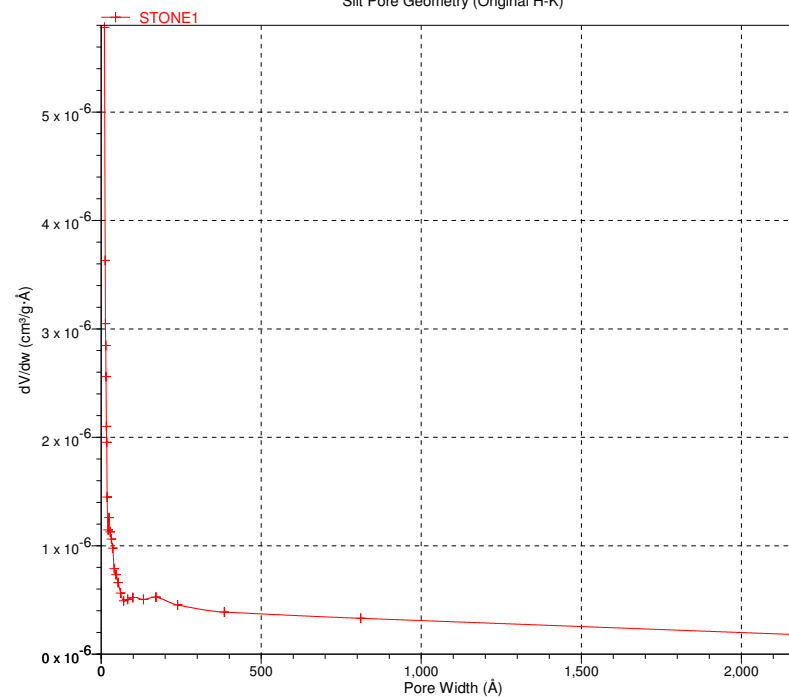
Horvath-Kawazoe Cumulative Pore Volume Plot

Slit Pore Geometry (Original H-K)



Horvath-Kawazoe Differential Pore Volume Plot

Slit Pore Geometry (Original H-K)





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Sample: STONE1
Operator:
Submitter:
File: D:\DATA\2020\EVA\STONE1.SMP

Started: 2010-06-30 9:46:22 Analysis Adsorptive: N2
Completed: 2010-06-30 17:43:41 Analysis Bath Temp.: -195.696 °C
Report Time: 2010-11-15 15:11:35 Thermal Correction: No
Sample Mass: 15.0799 g Smoothed Pressures: No
Warm Free Space: 22.9868 cm³ Measured Cold Free Space: 69.1966 cm³
Equilibration Interval: 10 s Low Pressure Dose: None
Automatic Degas: Yes

Summary Report

Surface Area

Single point surface area at $p/p^* = 0.306493757$: 0.1889 m²/g

BET Surface Area: 0.1840 m²/g

t-Plot Micropore Area: 0.0673 m²/g

t-Plot External Surface Area: 0.1167 m²/g

BJH Adsorption cumulative surface area of pores
between 17.000 Å and 3000.000 Å diameter: 0.1360 m²/g

BJH Desorption cumulative surface area of pores
between 17.000 Å and 3000.000 Å diameter: 0.2716 m²/g

Pore Volume

Single point adsorption total pore volume of pores
less than 1302.8106 Å at $p/p^* = 0.984915925$: 0.000648 cm³/g

t-Plot micropore volume: 0.000037 cm³/g

BJH Adsorption cumulative volume of pores
between 17.000 Å and 3000.000 Å diameter: 0.000622 cm³/g

BJH Desorption cumulative volume of pores
between 17.000 Å and 3000.000 Å diameter: 0.000378 cm³/g

Pore Size

Adsorption average pore width (4V/A by BET): 140.9215 Å

BJH Adsorption average pore diameter (4V/A): 182.944 Å

BJH Desorption average pore diameter (4V/A): 55.630 Å

Horvath-Kawazoe

Maximum pore volume at $p/p^* = 0.984915925$: 0.000648 cm³/g

Median pore width: 558.1430 Å

Dubinin-Radushkevich

Micropore surface area: 0.0000 m²/g

Monolayer capacity: 0.000000 cm³/g



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Sample: STONE1
Operator:
Submitter:
File: D:\DATA\2020\EVA\STONE1.SMP

Started: 2010-06-30 9:46:22 Analysis Adsorptive: N2
Completed: 2010-06-30 17:43:41 Analysis Bath Temp.: -195.696 °C
Report Time: 2010-11-15 15:11:35 Thermal Correction: No
Sample Mass: 15.0799 g Smoothed Pressures: No
Warm Free Space: 22.9868 cm³ Measured Cold Free Space: 69.1966 cm³
Equilibration Interval: 10 s Low Pressure Dose: None
Automatic Degas: Yes

Dubinin-Astakhov

Micropore surface area: 0.2289 m²/g

Limiting micropore volume: 0.000108 cm³/g

MP-Method

Cumulative surface area of pores between
18.5627 Å and 18.5627 Å hydraulic radius: 0.0000 m²/g

Cumulative pore volume of pores between
18.5627 Å and 18.5627 Å hydraulic radius: 0.000000 cm³/g

Average pore hydraulic radius (V/A): 0.0000 Å

A2.5 N₂ adsorption isotherms (as referenced to in Section 3.2.1) for the HV sample size fraction 2–3 mm



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Sample: STONE5_2
 Operator:
 Submitter:
 File: D:\DATA\2020\EVA\STONE5_2.SMP

Sample: STONE5_2
 Operator:
 Submitter:
 File: D:\DATA\2020\EVA\STONE5_2.SMP

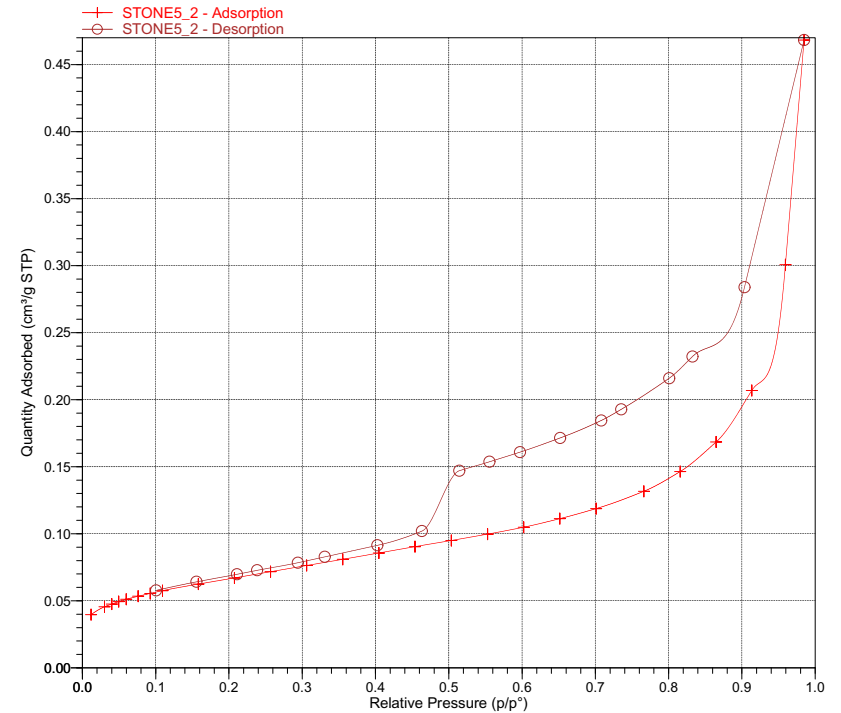
Started: 2010-08-19 9:30:17 Analysis Adsorptive: N2
 Completed: 2010-08-19 14:59:06 Analysis Bath Temp.: -195.716 °C
 Report Time: 2010-08-30 13:51:37 Thermal Correction: No
 Sample Mass: 13.4041 g Smoothed Pressures: No
 Warm Free Space: 22.5588 cm³ Measured Cold Free Space: 65.2999 cm³
 Equilibration Interval: 10 s Low Pressure Dose: None
 Automatic Degas: No

Started: 2010-08-19 9:30:17 Analysis Adsorptive: N2
 Completed: 2010-08-19 14:59:06 Analysis Bath Temp.: -195.716 °C
 Report Time: 2010-08-30 13:51:37 Thermal Correction: No
 Sample Mass: 13.4041 g Smoothed Pressures: No
 Warm Free Space: 22.5588 cm³ Measured Cold Free Space: 65.2999 cm³
 Equilibration Interval: 10 s Low Pressure Dose: None
 Automatic Degas: No

Isotherm Tabular Report

Relative Pressure (p/p ^o)	Absolute Pressure (mmHg)	Quantity Adsorbed (cm ³ /g STP)	Elapsed Time (h:min)	Saturation Pressure (mmHg)
			01:41	767.06036
0.011697437	8.97739	0.0397	03:03	
0.030253059	23.21881	0.0455	03:07	
0.040080440	30.76179	0.0476	03:10	
0.049550579	38.03086	0.0494	03:13	
0.059714317	45.83258	0.0511	03:16	
0.075898555	58.25562	0.0534	03:19	
0.092490836	70.99232	0.0555	03:22	
0.109227443	83.84031	0.0576	03:25	
0.158157467	121.40015	0.0625	03:28	
0.207514173	159.28793	0.0671	03:30	
0.256854283	197.16650	0.0717	03:34	
0.306082984	234.95999	0.0763	03:37	
0.355358041	272.79053	0.0810	03:40	
0.404549126	310.55606	0.0857	03:42	
			03:45	767.67456
0.453860361	348.41705	0.0904	03:47	
0.503435478	386.47461	0.0950	03:50	
0.552872015	424.42578	0.0997	03:52	
0.602070589	462.19427	0.1049	03:54	
0.651436922	500.09155	0.1113	03:58	
0.700884590	538.05127	0.1188	04:00	
0.766231183	588.21619	0.1317	04:02	
0.815743808	626.22577	0.1464	04:05	
0.864843714	663.91852	0.1685	04:07	
0.913533446	701.29639	0.2069	04:09	
0.959451500	736.54651	0.3007	04:13	
0.984728143	755.95074	0.4682	04:19	
0.903562132	693.64166	0.2840	04:23	
0.832583057	639.15283	0.2322	04:26	
0.800791726	614.74744	0.2160	04:29	
0.735340980	564.50256	0.1928	04:31	
0.708155464	543.63293	0.1845	04:35	
0.651991957	500.51764	0.1715	04:39	
0.597216396	458.46783	0.1609	04:43	
0.555633357	426.54559	0.1537	04:46	
0.514291501	394.80850	0.1470	04:49	
0.463426907	355.76105	0.1020	04:54	
0.402553075	309.02975	0.0914	04:56	
0.330647748	253.82986	0.0827	04:59	
0.293967162	225.67111	0.0784	05:02	
0.238383695	183.00110	0.0727	05:05	
0.210907146	161.90805	0.0698	05:08	
0.155605798	119.45461	0.0641	05:11	
0.100735664	77.33221	0.0578	05:14	

Isotherm Linear Plot





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Sample: STONE5_2
 Operator:
 Submitter:
 File: D:\DATA\2020\EVA\STONE5_2.SMP

Started: 2010-08-19 9:30:17 Analysis Adsorptive: N2
 Completed: 2010-08-19 14:59:06 Analysis Bath Temp.: -195.716 °C
 Report Time: 2010-08-30 13:51:37 Thermal Correction: No
 Sample Mass: 13.4041 g Smoothed Pressures: No
 Warm Free Space: 22.5588 cm³ Measured Cold Free Space: 65.2999 cm³
 Equilibration Interval: 10 s Low Pressure Dose: None
 Automatic Degas: No

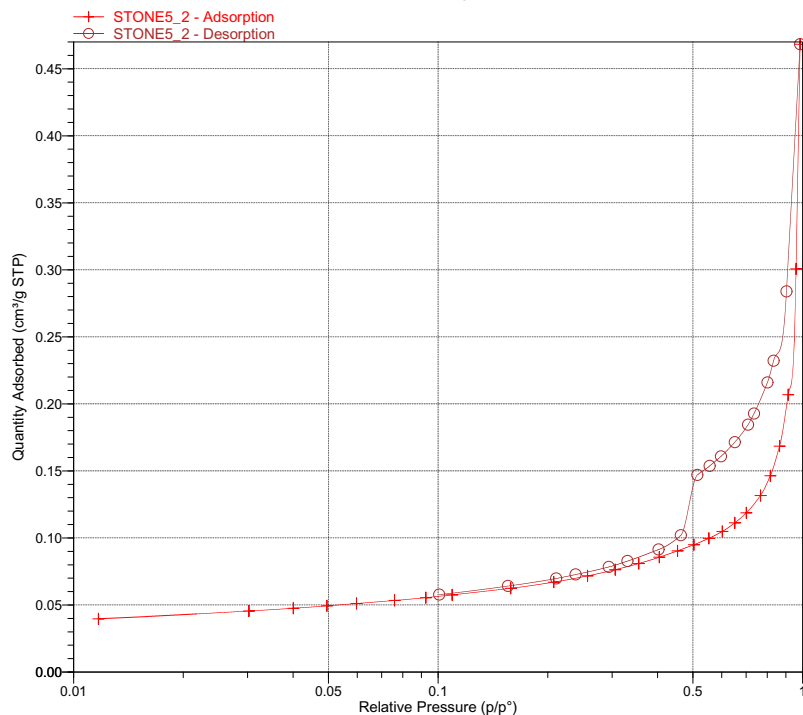


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Sample: STONE5_2
 Operator:
 Submitter:
 File: D:\DATA\2020\EVA\STONE5_2.SMP

Started: 2010-08-19 9:30:17 Analysis Adsorptive: N2
 Completed: 2010-08-19 14:59:06 Analysis Bath Temp.: -195.716 °C
 Report Time: 2010-08-30 13:51:37 Thermal Correction: No
 Sample Mass: 13.4041 g Smoothed Pressures: No
 Warm Free Space: 22.5588 cm³ Measured Cold Free Space: 65.2999 cm³
 Equilibration Interval: 10 s Low Pressure Dose: None
 Automatic Degas: No

Isotherm Log Plot



BET Surface Area Report

BET Surface Area: 0.2325 ± 0.0022 m²/g
 Slope: 18.626372 ± 0.174861 g/cm³ STP
 Y-Intercept: 0.096725 ± 0.036111 g/cm³ STP
 C: 193.569432
 Qm: 0.0534 cm³/g STP
 Correlation Coefficient: 0.9996917
 Molecular Cross-Sectional Area: 0.1620 nm²

Relative Pressure (p/p°)	Quantity Adsorbed (cm ³ /g STP)	1/[Q(p°/p - 1)]
0.059714317	0.0511	1.242808
0.075898555	0.0534	1.539117
0.092490836	0.0555	1.836502
0.109227443	0.0576	2.130326
0.158157467	0.0625	3.008186
0.207514173	0.0671	3.904358
0.256854283	0.0717	4.820222
0.306082984	0.0763	5.778336
0.355358041	0.0810	6.809577



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Sample: STONE5_2
Operator:
Submitter:
File: D:\DATA\2020\EVA\STONE5_2.SMP

Started: 2010-08-19 9:30:17 Analysis Adsorptive: N2
Completed: 2010-08-19 14:59:06 Analysis Bath Temp.: -195.716 °C
Report Time: 2010-08-30 13:51:37 Thermal Correction: No
Sample Mass: 13.4041 g Smoothed Pressures: No
Warm Free Space: 22.5588 cm³ Measured Cold Free Space: 65.2999 cm³
Equilibration Interval: 10 s Low Pressure Dose: None
Automatic Degas: No

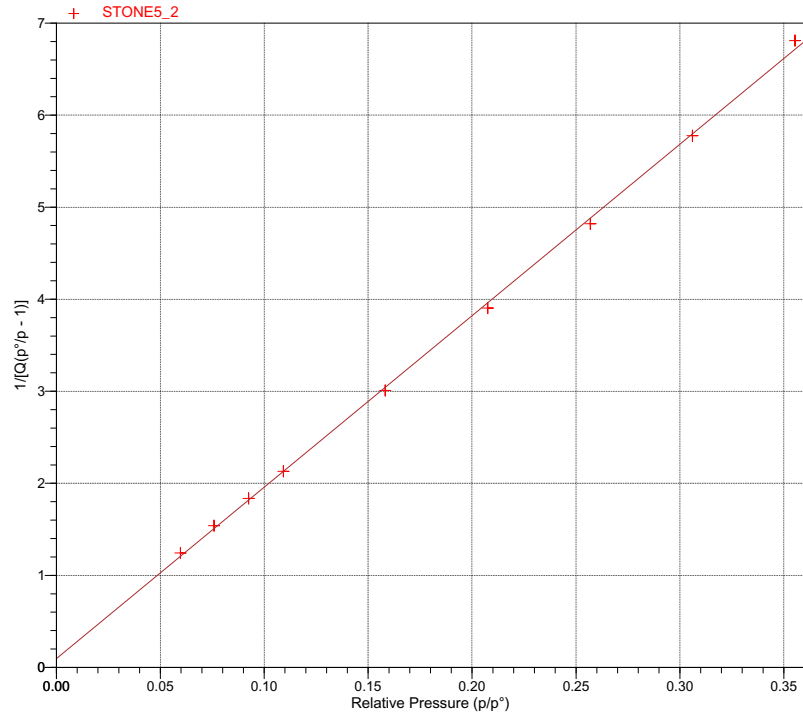


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Sample: STONE5_2
Operator:
Submitter:
File: D:\DATA\2020\EVA\STONE5_2.SMP

Started: 2010-08-19 9:30:17 Analysis Adsorptive: N2
Completed: 2010-08-19 14:59:06 Analysis Bath Temp.: -195.716 °C
Report Time: 2010-08-30 13:51:37 Thermal Correction: No
Sample Mass: 13.4041 g Smoothed Pressures: No
Warm Free Space: 22.5588 cm³ Measured Cold Free Space: 65.2999 cm³
Equilibration Interval: 10 s Low Pressure Dose: None
Automatic Degas: No

BET Surface Area Plot



Langmuir Reports

Primary Data
4052- Fewer than two points are selected for this report.



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Unit 1

Serial #: 182

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Sample: STONE5_2
 Operator:
 Submitter:
 File: D:\DATA\2020\EVA\STONE5_2.SMP

Started: 2010-08-19 9:30:17
 Completed: 2010-08-19 14:59:06
 Report Time: 2010-08-30 13:51:37
 Sample Mass: 13.4041 g
 Warm Free Space: 22.5588 cm³ Measured
 Equilibration Interval: 10 s
 Automatic Degas: No

Analysis Adsorptive: N2
 Analysis Bath Temp.: -195.716 °C
 Thermal Correction: No
 Smoothed Pressures: No
 Cold Free Space: 65.2999 cm³
 Low Pressure Dose: None

t-Plot Report

Micropore Volume: 0.000005 cm³/g STP
 Micropore Area: 0.0090 m²/g
 External Surface Area: 0.2235 m²/g
 Slope: 0.014450 ± 0.000095 cm³/g-Å STP
 Y-Intercept: 0.003288 ± 0.000395 cm³/g STP
 Correlation Coefficient: 0.999935
 Surface Area Correction Factor: 1.000
 Density Conversion Factor: 0.0015468
 Total Surface Area (BET): 0.2325 m²/g
 Thickness Range: 3.5000 Å to 5.0000 Å
 Thickness Equation: Harkins and Jura
 $t = [13.99 / (0.034 - \log(p/p^*))] ^ 0.5$

Relative Pressure (p/p*)	Statistical Thickness (Å)	Quantity Adsorbed (cm ³ /g STP)
0.011697437	2.6676	0.0397
0.030253059	3.0012	0.0455
0.040080440	3.1266	0.0476
0.049550579	3.2324	0.0494
0.059714317	3.3349	0.0511
0.075898555	3.4822	0.0534
0.092490836	3.6195	0.0555
0.109227443	3.7484	0.0576
0.158157467	4.0934	0.0625
0.207514173	4.4174	0.0671
0.256854283	4.7338	0.0717
0.306082984	5.0519	0.0763
0.355358041	5.3800	0.0810
0.404549126	5.7237	0.0857
0.453860361	6.0911	0.0904
0.503435478	6.4909	0.0950
0.552872015	6.9292	0.0997
0.602070589	7.4164	0.1049
0.651436922	7.9721	0.1113
0.700884590	8.6183	0.1188
0.766231183	9.6691	0.1317
0.815743808	10.6890	0.1464
0.864843714	12.0056	0.1685
0.913533446	13.8175	0.2069
0.959451500	16.4060	0.3007
0.984728143	18.5438	0.4682



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Unit 1

Serial #: 182

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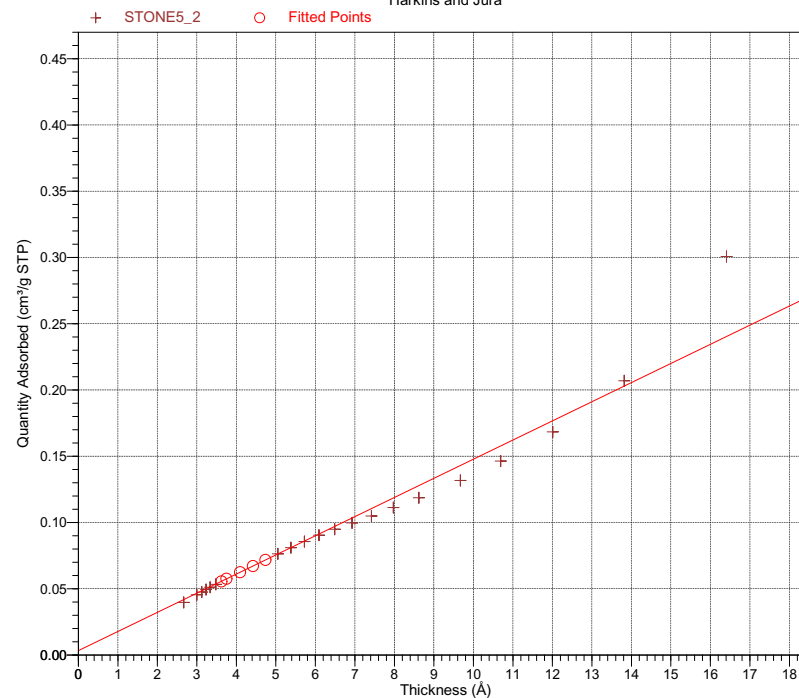
Sample: STONE5_2
 Operator:
 Submitter:
 File: D:\DATA\2020\EVA\STONE5_2.SMP

Started: 2010-08-19 9:30:17
 Completed: 2010-08-19 14:59:06
 Report Time: 2010-08-30 13:51:37
 Sample Mass: 13.4041 g
 Warm Free Space: 22.5588 cm³ Measured
 Equilibration Interval: 10 s
 Automatic Degas: No

Analysis Adsorptive: N2
 Analysis Bath Temp.: -195.716 °C
 Thermal Correction: No
 Smoothed Pressures: No
 Cold Free Space: 65.2999 cm³
 Low Pressure Dose: None

t-Plot

Harkins and Jura





Sample: STONE5_2
 Operator:
 Submitter:
 File: D:\DATA\2020\EVA\STONE5_2.SMP

Started: 2010-08-19 9:30:17 Analysis Adsorptive: N2
 Completed: 2010-08-19 14:59:06 Analysis Bath Temp.: -195.716 °C
 Report Time: 2010-08-30 13:51:37 Thermal Correction: No
 Sample Mass: 13.4041 g Smoothed Pressures: No
 Warm Free Space: 22.5588 cm³ Measured Cold Free Space: 65.2999 cm³
 Equilibration Interval: 10 s Low Pressure Dose: None
 Automatic Degas: No

BJH Adsorption Pore Distribution Report

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

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

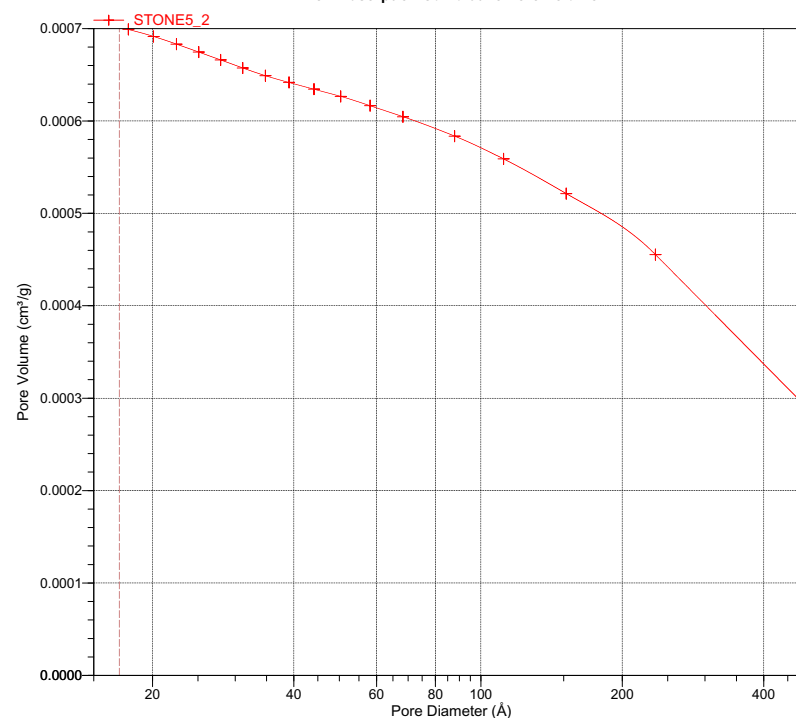
Pore Diameter Range (Å)	Average Diameter (Å)	Incremental Pore Volume (cm³/g)	Cumulative Pore Volume (cm³/g)	Incremental Pore Area (m²/g)	Cumulative Pore Area (m²/g)
1284.6 - 493.0	589.7	0.000290	0.000290	0.020	0.020
493.0 - 235.3	280.2	0.000165	0.000455	0.024	0.043
235.3 - 151.8	175.3	0.000066	0.000522	0.015	0.058
151.8 - 111.7	125.3	0.000037	0.000559	0.012	0.070
111.7 - 87.9	96.8	0.000025	0.000584	0.010	0.081
87.9 - 68.3	75.4	0.000021	0.000605	0.011	0.092
68.3 - 58.1	62.2	0.000012	0.000617	0.008	0.099
58.1 - 50.3	53.6	0.000010	0.000627	0.008	0.107
50.3 - 44.1	46.7	0.000008	0.000634	0.007	0.113
44.1 - 39.1	41.2	0.000007	0.000642	0.007	0.121
39.1 - 34.8	36.6	0.000007	0.000649	0.008	0.129
34.8 - 31.1	32.7	0.000008	0.000657	0.010	0.139
31.1 - 27.9	29.3	0.000009	0.000666	0.012	0.151
27.9 - 25.1	26.3	0.000009	0.000675	0.013	0.164
25.1 - 22.5	23.6	0.000009	0.000683	0.015	0.178
22.5 - 20.1	21.1	0.000008	0.000692	0.016	0.194
20.1 - 17.8	18.8	0.000008	0.000699	0.016	0.210



Sample: STONE5_2
 Operator:
 Submitter:
 File: D:\DATA\2020\EVA\STONE5_2.SMP

Started: 2010-08-19 9:30:17 Analysis Adsorptive: N2
 Completed: 2010-08-19 14:59:06 Analysis Bath Temp.: -195.716 °C
 Report Time: 2010-08-30 13:51:37 Thermal Correction: No
 Sample Mass: 13.4041 g Smoothed Pressures: No
 Warm Free Space: 22.5588 cm³ Measured Cold Free Space: 65.2999 cm³
 Equilibration Interval: 10 s Low Pressure Dose: None
 Automatic Degas: No

BJH Adsorption Cumulative Pore Volume





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Sample: STONE5_2
 Operator:
 Submitter:
 File: D:\DATA\2020\EVA\STONE5_2.SMP

Started: 2010-08-19 9:30:17 Analysis Adsorptive: N2
 Completed: 2010-08-19 14:59:06 Analysis Bath Temp.: -195.716 °C
 Report Time: 2010-08-30 13:51:37 Thermal Correction: No
 Sample Mass: 13.4041 g Smoothed Pressures: No
 Warm Free Space: 22.5588 cm³ Measured Cold Free Space: 65.2999 cm³
 Equilibration Interval: 10 s Low Pressure Dose: None
 Automatic Degas: No

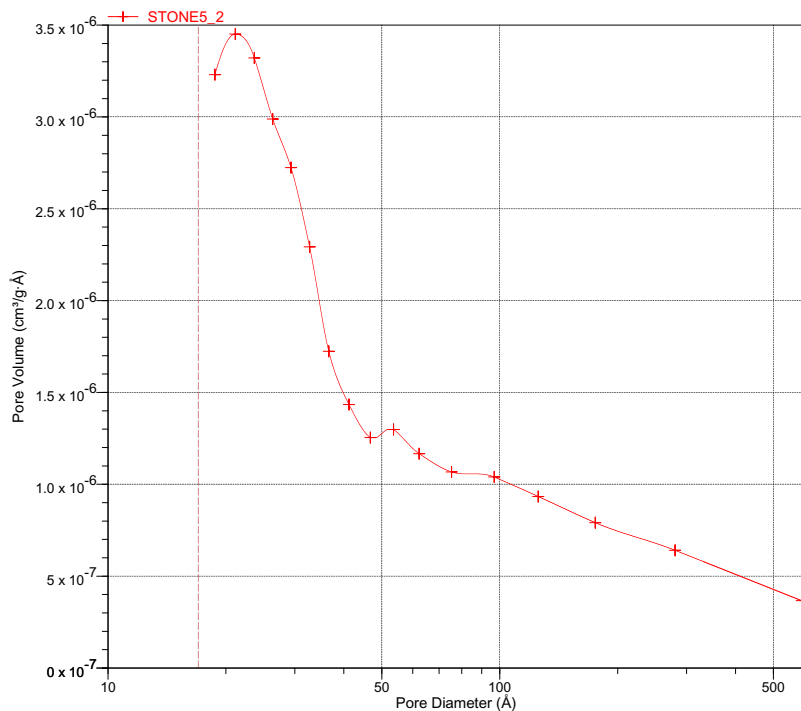


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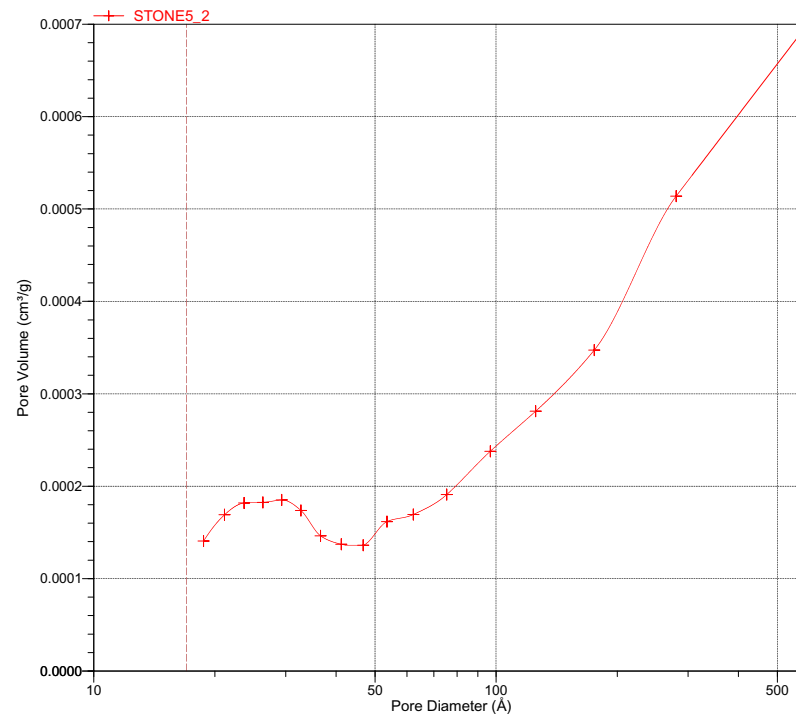
Sample: STONE5_2
 Operator:
 Submitter:
 File: D:\DATA\2020\EVA\STONE5_2.SMP

Started: 2010-08-19 9:30:17 Analysis Adsorptive: N2
 Completed: 2010-08-19 14:59:06 Analysis Bath Temp.: -195.716 °C
 Report Time: 2010-08-30 13:51:37 Thermal Correction: No
 Sample Mass: 13.4041 g Smoothed Pressures: No
 Warm Free Space: 22.5588 cm³ Measured Cold Free Space: 65.2999 cm³
 Equilibration Interval: 10 s Low Pressure Dose: None
 Automatic Degas: No

BJH Adsorption dV/dD Pore Volume



BJH Adsorption dV/dlog(D) Pore Volume





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Unit 1

Serial #: 182

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Sample: STONE5_2
Operator:
Submitter:
File: D:\DATA\2020\EVA\STONE5_2.SMP

Started: 2010-08-19 9:30:17
Completed: 2010-08-19 14:59:06
Report Time: 2010-08-30 13:51:37
Sample Mass: 13.4041 g
Warm Free Space: 22.5588 cm³ Measured
Equilibration Interval: 10 s
Automatic Degas: No

Analysis Adsorptive: N2
Analysis Bath Temp.: -195.716 °C
Thermal Correction: No
Smoothed Pressures: No
Cold Free Space: 65.2999 cm³
Low Pressure Dose: None



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Serial #: 182

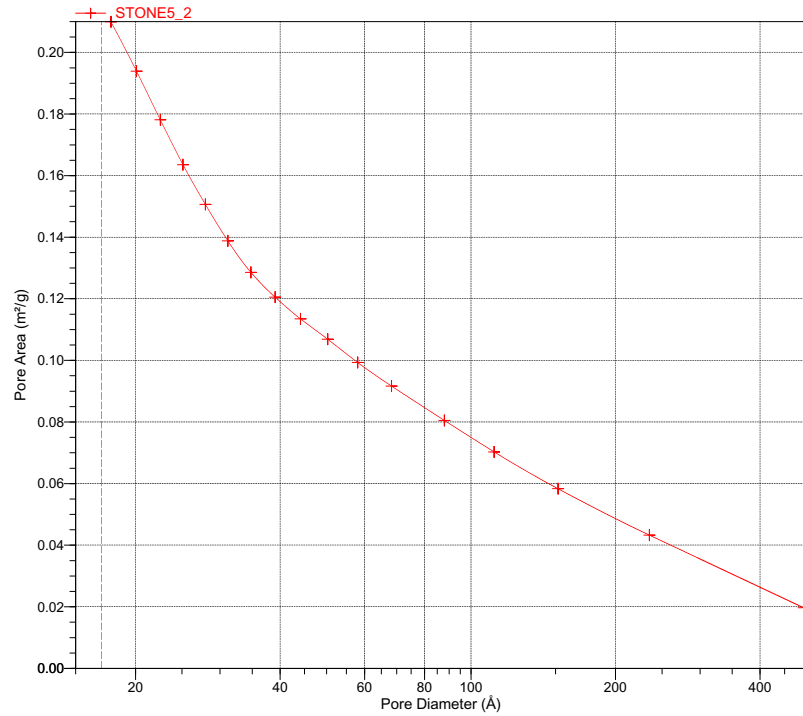
Page 14

Sample: STONE5_2
Operator:
Submitter:
File: D:\DATA\2020\EVA\STONE5_2.SMP

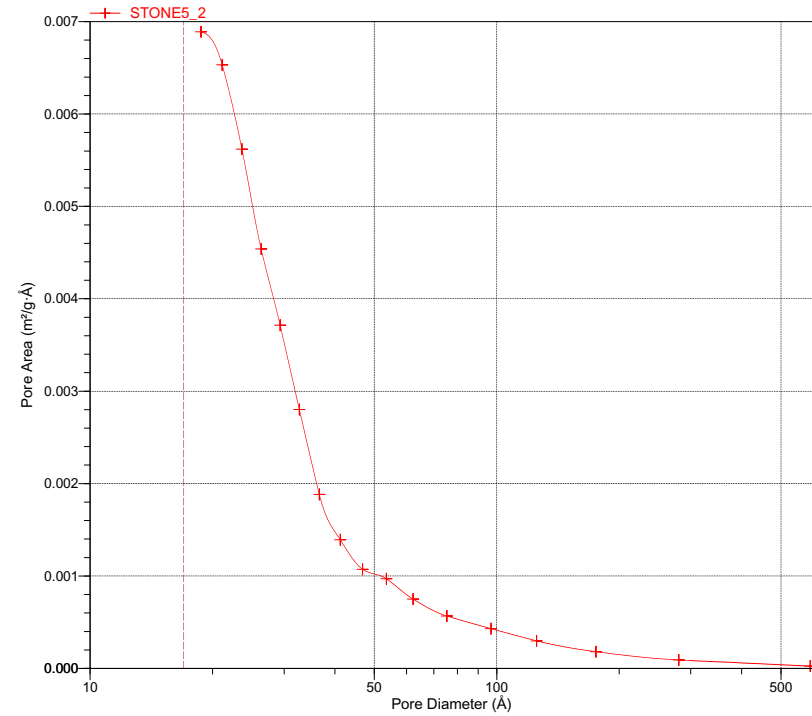
Started: 2010-08-19 9:30:17
Completed: 2010-08-19 14:59:06
Report Time: 2010-08-30 13:51:37
Sample Mass: 13.4041 g
Warm Free Space: 22.5588 cm³ Measured
Equilibration Interval: 10 s
Automatic Degas: No

Analysis Adsorptive: N2
Analysis Bath Temp.: -195.716 °C
Thermal Correction: No
Smoothed Pressures: No
Cold Free Space: 65.2999 cm³
Low Pressure Dose: None

BJH Adsorption Cumulative Pore Area



BJH Adsorption dA/dD Pore Area





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Sample: STONE5_2
 Operator:
 Submitter:
 File: D:\DATA\2020\EVA\STONE5_2.SMP

Started: 2010-08-19 9:30:17 Analysis Adsorptive: N2
 Completed: 2010-08-19 14:59:06 Analysis Bath Temp.: -195.716 °C
 Report Time: 2010-08-30 13:51:37 Thermal Correction: No
 Sample Mass: 13.4041 g Smoothed Pressures: No
 Warm Free Space: 22.5588 cm³ Measured Cold Free Space: 65.2999 cm³
 Equilibration Interval: 10 s Low Pressure Dose: None
 Automatic Degas: No

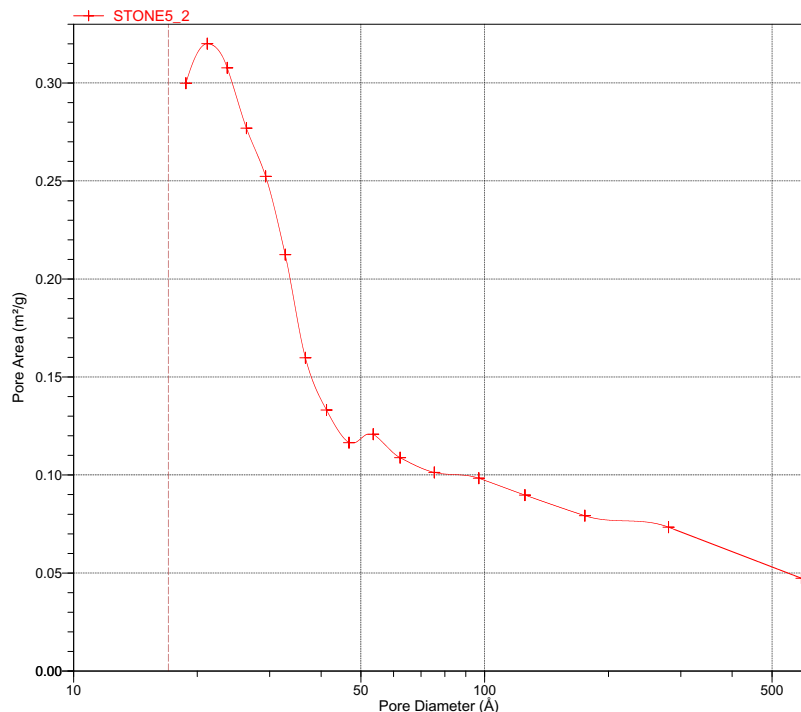


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Sample: STONE5_2
 Operator:
 Submitter:
 File: D:\DATA\2020\EVA\STONE5_2.SMP

Started: 2010-08-19 9:30:17 Analysis Adsorptive: N2
 Completed: 2010-08-19 14:59:06 Analysis Bath Temp.: -195.716 °C
 Report Time: 2010-08-30 13:51:37 Thermal Correction: No
 Sample Mass: 13.4041 g Smoothed Pressures: No
 Warm Free Space: 22.5588 cm³ Measured Cold Free Space: 65.2999 cm³
 Equilibration Interval: 10 s Low Pressure Dose: None
 Automatic Degas: No

BJH Adsorption dA/dlog(D) Pore Area



Horvath-Kawazoe Report

Slit Pore Geometry (Original H-K)

Maximum Pore Volume: 0.000724 cm³/g
 at Relative Pressure: 0.984728143
 Median Pore Width: 499.369 Å
 Relative Pressure Range: 1.170e-02 to 9.847e-01

Diameter of Adsorptive Molecule: 3.000 Å
 Diameter of Adsorptive at Zero Interaction Energy: 2.574 Å
 Diameter of Sample Atom: 3.040 Å
 Diameter of Sample Atom at Zero Interaction Energy: 2.609 Å
 Interaction Parameter: 3.49e-43 erg·cm⁴

Density Conversion Factor: 0.0015468

Absolute Pressure (mmHg)	Relative Pressure (p/p ⁰)	Quantity Adsorbed (cm ³ /g STP)	Pore Width (Å)	Cumulative Pore Volume (cm ³ /g)	Differential Pore Volume (cm ³ /g·Å)
8.97739	0.011697437	0.0397	10.491	0.0001	0.0000
23.21881	0.030253059	0.0455	12.641	0.0001	0.0000
30.76179	0.040080440	0.0476	13.515	0.0001	0.0000
38.03086	0.049550579	0.0494	14.276	0.0001	0.0000
45.83258	0.059714317	0.0511	15.038	0.0001	0.0000
58.25562	0.075898555	0.0534	16.190	0.0001	0.0000
70.99232	0.092490836	0.0555	17.305	0.0001	0.0000
83.84031	0.109227443	0.0576	18.395	0.0001	0.0000
121.40015	0.158157467	0.0625	21.525	0.0001	0.0000
159.28793	0.207514173	0.0671	24.743	0.0001	0.0000
197.16650	0.256854283	0.0717	28.160	0.0001	0.0000
234.95999	0.306082984	0.0763	31.904	0.0001	0.0000
272.79053	0.355358041	0.0810	36.098	0.0001	0.0000
310.55606	0.404549126	0.0857	40.794	0.0001	0.0000
348.41705	0.453860361	0.0904	46.317	0.0001	0.0000
386.47461	0.503435478	0.0950	52.833	0.0001	0.0000
424.42578	0.552872015	0.0997	60.711	0.0002	0.0000
462.19427	0.602070589	0.1049	70.401	0.0002	0.0000
500.09155	0.651436922	0.1113	82.886	0.0002	0.0000
538.05127	0.700884590	0.1188	99.211	0.0002	0.0000
588.21619	0.766231183	0.1317	131.932	0.0002	0.0000
626.22577	0.815743808	0.1464	171.074	0.0002	0.0000
663.91852	0.864843714	0.1685	238.978	0.0003	0.0000
701.29639	0.913533446	0.2069	384.189	0.0003	0.0000
736.54651	0.959451500	0.3007	848.864	0.0005	0.0000
755.95074	0.984728143	0.4682	2126.720	0.0007	0.0000



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Unit 1

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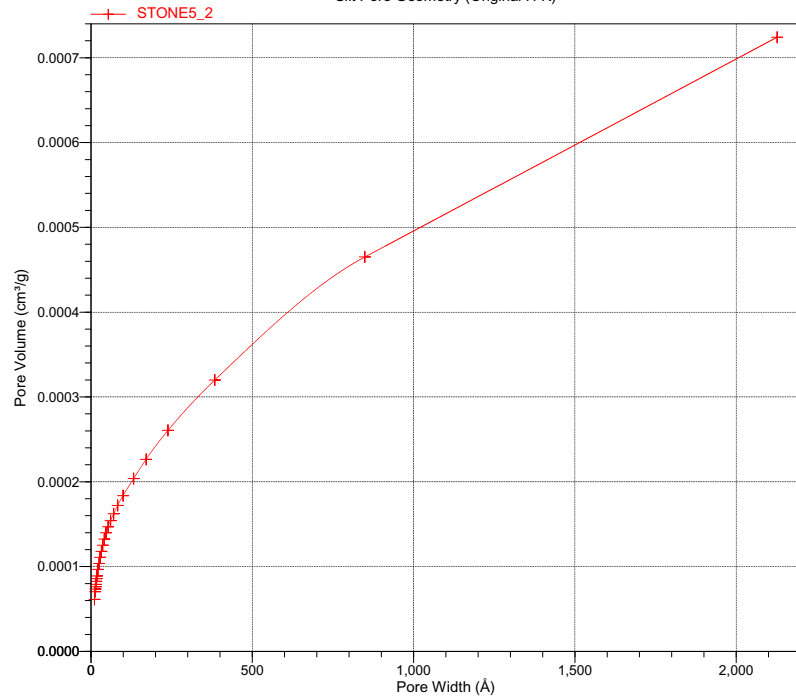
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Sample: STONE5_2
Operator:
Submitter:
File: D:\DATA\2020\EVA\STONE5_2.SMP

Started: 2010-08-19 9:30:17
Completed: 2010-08-19 14:59:06
Report Time: 2010-08-30 13:51:37
Sample Mass: 13.4041 g
Warm Free Space: 22.5588 cm³ Measured
Equilibration Interval: 10 s
Automatic Degas: No

Analysis Adsorptive: N2
Analysis Bath Temp.: -195.716 °C
Thermal Correction: No
Smoothed Pressures: No
Cold Free Space: 65.2999 cm³
Low Pressure Dose: None

Horvath-Kawazoe Cumulative Pore Volume Plot
Slit Pore Geometry (Original H-K)



ASAP 2020 V1.05 H

Unit 1

Serial #: 182

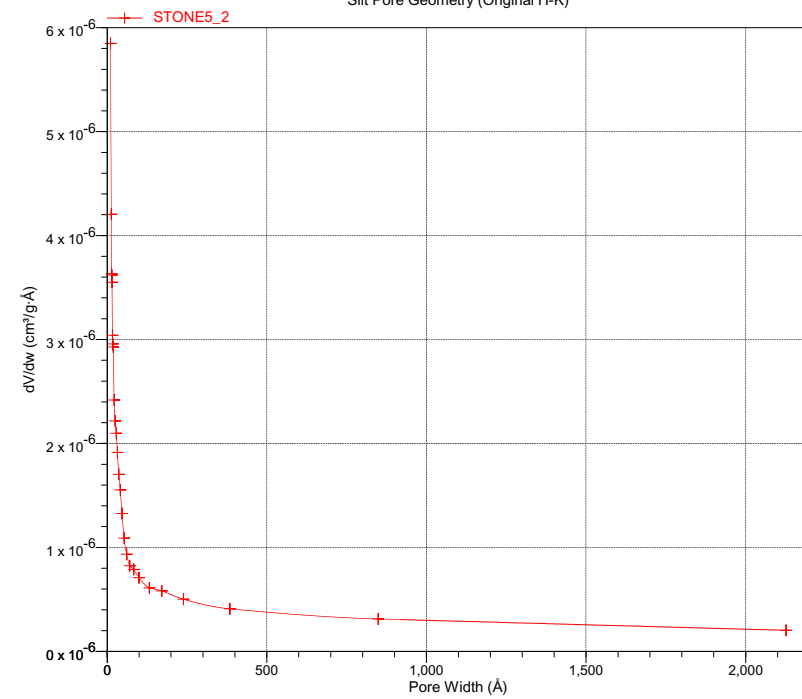
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Sample: STONE5_2
Operator:
Submitter:
File: D:\DATA\2020\EVA\STONE5_2.SMP

Started: 2010-08-19 9:30:17
Completed: 2010-08-19 14:59:06
Report Time: 2010-08-30 13:51:37
Sample Mass: 13.4041 g
Warm Free Space: 22.5588 cm³ Measured
Equilibration Interval: 10 s
Automatic Degas: No

Analysis Adsorptive: N2
Analysis Bath Temp.: -195.716 °C
Thermal Correction: No
Smoothed Pressures: No
Cold Free Space: 65.2999 cm³
Low Pressure Dose: None

Horvath-Kawazoe Differential Pore Volume Plot
Slit Pore Geometry (Original H-K)





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Unit 1

Serial #: 182

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Sample: STONE5_2
 Operator:
 Submitter:
 File: D:\DATA\2020\EVA\STONE5_2.SMP

Started: 2010-08-19 9:30:17 Analysis Adsorptive: N2
 Completed: 2010-08-19 14:59:06 Analysis Bath Temp.: -195.716 °C
 Report Time: 2010-08-30 13:51:37 Thermal Correction: No
 Sample Mass: 13.4041 g Smoothed Pressures: No
 Warm Free Space: 22.5588 cm³ Measured Cold Free Space: 65.2999 cm³
 Equilibration Interval: 10 s Low Pressure Dose: None
 Automatic Degas: No

Summary Report

Surface Area

Single point surface area at $p/p^* = 0.306082984$: 0.2306 m²/g

BET Surface Area: 0.2325 m²/g

t-Plot Micropore Area: 0.0090 m²/g

t-Plot External Surface Area: 0.2235 m²/g

BJH Adsorption cumulative surface area of pores
 between 17.000 Å and 3000.000 Å diameter: 0.2099 m²/g

BJH Desorption cumulative surface area of pores
 between 17.000 Å and 3000.000 Å diameter: 0.3402 m²/g

Pore Volume

Single point adsorption total pore volume of pores
 less than 1287.0712 Å at $p/p^* = 0.984728143$: 0.000724 cm³/g

t-Plot micropore volume: 0.000005 cm³/g

BJH Adsorption cumulative volume of pores
 between 17.000 Å and 3000.000 Å diameter: 0.000699 cm³/g

BJH Desorption cumulative volume of pores
 between 17.000 Å and 3000.000 Å diameter: 0.000446 cm³/g

Pore Size

Adsorption average pore width (4V/A by BET): 124.6003 Å

BJH Adsorption average pore diameter (4V/A): 133.209 Å

BJH Desorption average pore diameter (4V/A): 52.474 Å

Horvath-Kawazoe

Maximum pore volume at $p/p^* = 0.984728143$: 0.000724 cm³/g

Median pore width: 499.3694 Å

Dubinin-Radushkevich

Micropore surface area: 0.0000 m²/g

Monolayer capacity: 0.000000 cm³/g



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Unit 1

Serial #: 182

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Sample: STONE5_2
 Operator:
 Submitter:
 File: D:\DATA\2020\EVA\STONE5_2.SMP

Started: 2010-08-19 9:30:17 Analysis Adsorptive: N2
 Completed: 2010-08-19 14:59:06 Analysis Bath Temp.: -195.716 °C
 Report Time: 2010-08-30 13:51:37 Thermal Correction: No
 Sample Mass: 13.4041 g Smoothed Pressures: No
 Warm Free Space: 22.5588 cm³ Measured Cold Free Space: 65.2999 cm³
 Equilibration Interval: 10 s Low Pressure Dose: None
 Automatic Degas: No

Dubinin-Astakhov

Micropore surface area: 0.2413 m²/g

Limiting micropore volume: 0.000119 cm³/g

MP-Method

Cumulative surface area of pores between
 18.5438 Å and 18.5438 Å hydraulic radius: 0.0000 m²/g

Cumulative pore volume of pores between
 18.5438 Å and 18.5438 Å hydraulic radius: 0.000000 cm³/g

Average pore hydraulic radius (V/A): 0.0000 Å

A2.6 N₂ adsorption isotherms (as referenced to in Section 3.2.1) for the M sample size fraction 0.25–0.5 mm



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Sample: STONE7
 Operator:
 Submitter:
 File: D:\DATA\2020\EVA\STONE7.SMP

Started: 2010-08-26 16:10:34 Analysis Adsorptive: N2
 Completed: 2010-08-27 11:57:51 Analysis Bath Temp.: -195.692 °C
 Report Time: 2010-08-30 13:51:00 Thermal Correction: No
 Sample Mass: 11.1358 g Smoothed Pressures: No
 Warm Free Space: 23.5373 cm³ Measured Cold Free Space: 68.4897 cm³
 Equilibration Interval: 10 s Low Pressure Dose: None
 Automatic Degas: Yes

Isotherm Tabular Report

Relative Pressure (p/p ⁰)	Absolute Pressure (mmHg)	Quantity Adsorbed (cm ³ /g STP)	Elapsed Time (h:min)	Saturation Pressure (mmHg)
			17:06	769.49225
0.011420284	8.78805	0.0507	17:23	
0.030000650	23.08600	0.0597	17:27	
0.040167827	30.90996	0.0632	17:30	
0.049385928	38.00365	0.0658	17:33	
0.059634298	45.89022	0.0686	17:36	
0.075893098	58.40199	0.0724	17:38	
0.092521979	71.19873	0.0758	17:41	
0.108868263	83.77799	0.0790	17:43	
0.158003664	121.58998	0.0872	17:46	
0.207747081	159.87021	0.0948	17:49	
0.257039923	197.80405	0.1021	17:52	
0.306243137	235.66890	0.1092	17:54	
0.355555916	273.61871	0.1161	17:57	
0.404843698	311.55011	0.1229	18:01	
0.454185583	349.52307	0.1299	18:04	
0.503512713	387.48444	0.1367	18:06	
0.552907539	425.49942	0.1440	18:10	
0.602290900	463.50604	0.1519	18:14	
0.651387941	501.29126	0.1607	18:16	
0.700641560	539.19720	0.1711	18:18	
0.766165317	589.62543	0.1893	18:21	
0.815659899	627.71832	0.2090	18:24	
0.864732786	665.48602	0.2378	18:26	
0.913137238	702.74060	0.2886	18:29	
0.959321616	738.28809	0.4092	18:33	
0.984076880	757.34534	0.6244	18:38	
0.884618993	680.80774	0.3309	18:43	
0.830629308	639.25989	0.2855	18:46	
0.800446556	616.03284	0.2680	18:48	
0.735368532	565.95062	0.2397	18:51	
0.707750018	544.69666	0.2301	18:53	
0.652159750	501.91571	0.2135	18:56	
0.596911285	459.39813	0.1997	19:00	
0.55575617	427.58710	0.1901	19:03	
0.514006695	395.59625	0.1814	19:06	
			19:08	769.63483
0.462051824	355.61118	0.1378	19:12	
0.402951514	310.12552	0.1247	19:16	
0.330567697	254.41641	0.1131	19:18	
0.294198128	226.42513	0.1071	19:21	
0.238172158	183.30559	0.0985	19:24	
0.210749592	162.20023	0.0941	19:27	
0.155542179	119.71068	0.0851	19:30	
0.100777868	77.56216	0.0749	19:32	

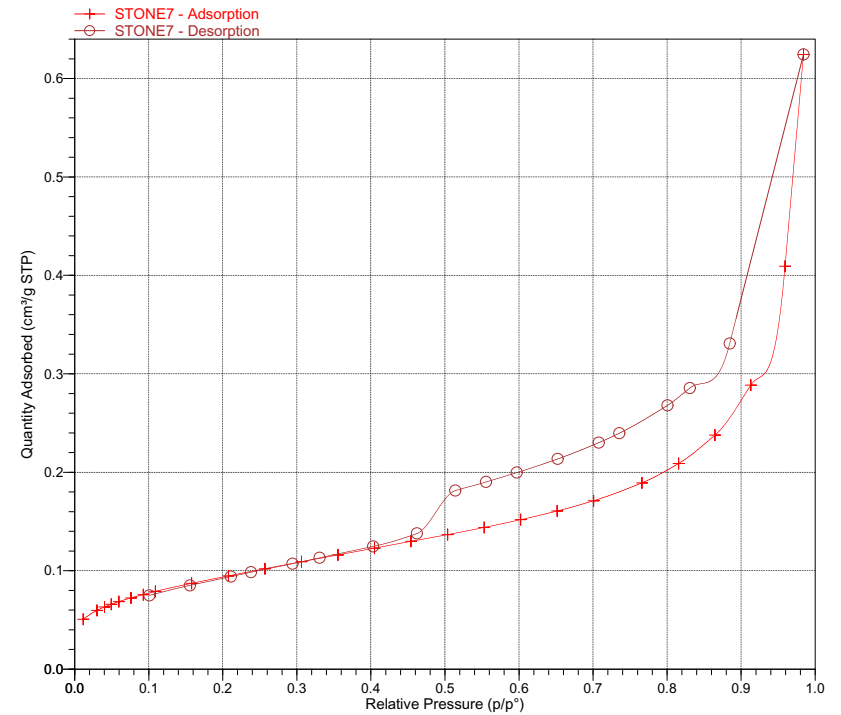


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Sample: STONE7
 Operator:
 Submitter:
 File: D:\DATA\2020\EVA\STONE7.SMP

Started: 2010-08-26 16:10:34 Analysis Adsorptive: N2
 Completed: 2010-08-27 11:57:51 Analysis Bath Temp.: -195.692 °C
 Report Time: 2010-08-30 13:51:00 Thermal Correction: No
 Sample Mass: 11.1358 g Smoothed Pressures: No
 Warm Free Space: 23.5373 cm³ Measured Cold Free Space: 68.4897 cm³
 Equilibration Interval: 10 s Low Pressure Dose: None
 Automatic Degas: Yes

Isotherm Linear Plot





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Sample: STONE7
 Operator:
 Submitter:
 File: D:\DATA\2020\EVA\STONE7.SMP

Started: 2010-08-26 16:10:34 Analysis Adsorptive: N2
 Completed: 2010-08-27 11:57:51 Analysis Bath Temp.: -195.692 °C
 Report Time: 2010-08-30 13:51:00 Thermal Correction: No
 Sample Mass: 11.1358 g Smoothed Pressures: No
 Warm Free Space: 23.5373 cm³ Measured Cold Free Space: 68.4897 cm³
 Equilibration Interval: 10 s Low Pressure Dose: None
 Automatic Degas: Yes

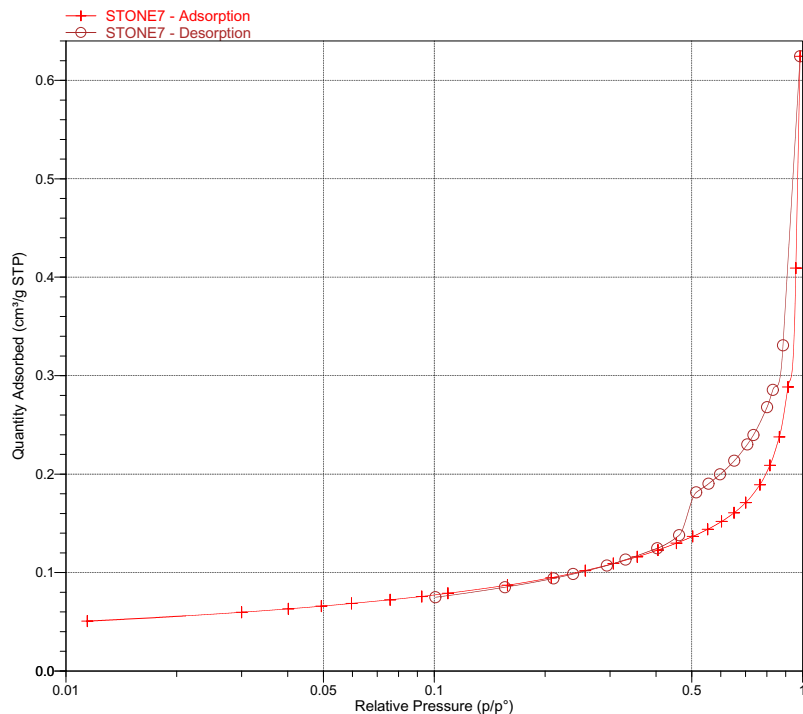


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Sample: STONE7
 Operator:
 Submitter:
 File: D:\DATA\2020\EVA\STONE7.SMP

Started: 2010-08-26 16:10:34 Analysis Adsorptive: N2
 Completed: 2010-08-27 11:57:51 Analysis Bath Temp.: -195.692 °C
 Report Time: 2010-08-30 13:51:00 Thermal Correction: No
 Sample Mass: 11.1358 g Smoothed Pressures: No
 Warm Free Space: 23.5373 cm³ Measured Cold Free Space: 68.4897 cm³
 Equilibration Interval: 10 s Low Pressure Dose: None
 Automatic Degas: Yes

Isotherm Log Plot



BET Surface Area Report

BET Surface Area: 0.3369 ± 0.0030 m²/g
 Slope: 12.769758 ± 0.114361 g/cm³ STP
 Y-Intercept: 0.149788 ± 0.023626 g/cm³ STP
 C: 86.252154
 Qm: 0.0774 cm³/g STP
 Correlation Coefficient: 0.9997194
 Molecular Cross-Sectional Area: 0.1620 nm²

Relative Pressure (p/p°)	Quantity Adsorbed (cm ³ /g STP)	1/[Q(p°/p - 1)]
0.059634298	0.0686	0.923939
0.075893098	0.0724	1.134872
0.092521979	0.0758	1.345393
0.108868263	0.0790	1.547080
0.158003664	0.0872	2.151853
0.207747081	0.0948	2.765896
0.257039923	0.1021	3.388127
0.306243137	0.1092	4.044113
0.355555916	0.1161	4.753077



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Sample: STONE7
Operator:
Submitter:
File: D:\DATA\2020\EVA\STONE7.SMP

Started: 2010-08-26 16:10:34 Analysis Adsorptive: N2
Completed: 2010-08-27 11:57:51 Analysis Bath Temp.: -195.692 °C
Report Time: 2010-08-30 13:51:00 Thermal Correction: No
Sample Mass: 11.1358 g Smoothed Pressures: No
Warm Free Space: 23.5373 cm³ Measured Cold Free Space: 68.4897 cm³
Equilibration Interval: 10 s Low Pressure Dose: None
Automatic Degas: Yes

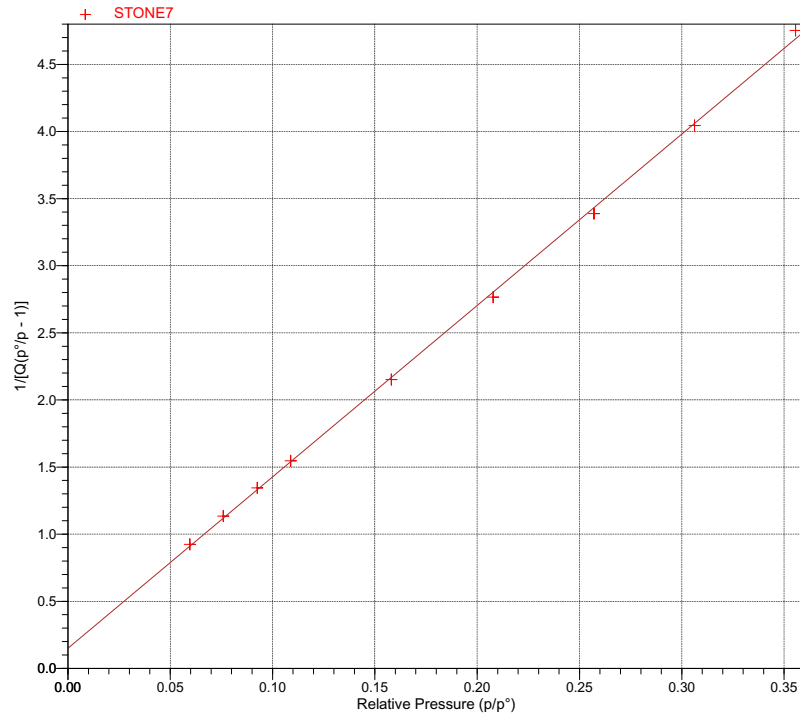


ASAP 2020 V1.05 H Unit 1 Serial #: 182 Page 6

Sample: STONE7
Operator:
Submitter:
File: D:\DATA\2020\EVA\STONE7.SMP

Started: 2010-08-26 16:10:34 Analysis Adsorptive: N2
Completed: 2010-08-27 11:57:51 Analysis Bath Temp.: -195.692 °C
Report Time: 2010-08-30 13:51:00 Thermal Correction: No
Sample Mass: 11.1358 g Smoothed Pressures: No
Warm Free Space: 23.5373 cm³ Measured Cold Free Space: 68.4897 cm³
Equilibration Interval: 10 s Low Pressure Dose: None
Automatic Degas: Yes

BET Surface Area Plot



Langmuir Reports

Primary Data
4052- Fewer than two points are selected for this report.



ASAP 2020 V1.05 H

Unit 1

Serial #: 182

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Sample: STONE7
 Operator:
 Submitter:
 File: D:\DATA\2020\EVA\STONE7.SMP

Started: 2010-08-26 16:10:34
 Completed: 2010-08-27 11:57:51
 Report Time: 2010-08-30 13:51:00
 Sample Mass: 11.1358 g
 Warm Free Space: 23.5373 cm³ Measured
 Equilibration Interval: 10 s
 Automatic Degas: Yes

Analysis Adsorptive: N2
 Analysis Bath Temp.: -195.692 °C
 Thermal Correction: No
 Smoothed Pressures: No
 Cold Free Space: 68.4897 cm³
 Low Pressure Dose: None

t-Plot Report

Micropore Volume: -0.000014 cm³/g STP
 Micropore Area: *
 External Surface Area: 0.3645 m²/g
 Slope: 0.023562 ± 0.000149 cm³/g·Å STP
 Y-Intercept: -0.009358 ± 0.000616 cm³/g STP
 Correlation Coefficient: 0.999940
 Surface Area Correction Factor: 1.000
 Density Conversion Factor: 0.0015468
 Total Surface Area (BET): 0.3369 m²/g
 Thickness Range: 3.5000 Å to 5.0000 Å
 Thickness Equation: Harkins and Jura
 $t = [13.99 / (0.034 - \log(p/p^*))] ^ 0.5$

Relative Pressure (p/p [*])	Statistical Thickness (Å)	Quantity Adsorbed (cm ³ /g STP)
0.011420284	2.6606	0.0507
0.030000650	2.9977	0.0597
0.040167827	3.1277	0.0632
0.049385928	3.2307	0.0658
0.059634298	3.3341	0.0686
0.075893098	3.4821	0.0724
0.092521979	3.6197	0.0758
0.108868263	3.7458	0.0790
0.158003664	4.0924	0.0872
0.207747081	4.4189	0.0948
0.257039923	4.7350	0.1021
0.306243137	5.0529	0.1092
0.35555916	5.3814	0.1161
0.404843698	5.7259	0.1229
0.454185583	6.0936	0.1299
0.503512713	6.4915	0.1367
0.552907539	6.9295	0.1440
0.602290900	7.4187	0.1519
0.651387941	7.9715	0.1607
0.700641560	8.6149	0.1711
0.766165317	9.6679	0.1893
0.815659899	10.6870	0.2090
0.864732786	12.0021	0.2378
0.913137238	13.7998	0.2886
0.959321616	16.3968	0.4092
0.984076880	18.4787	0.6244



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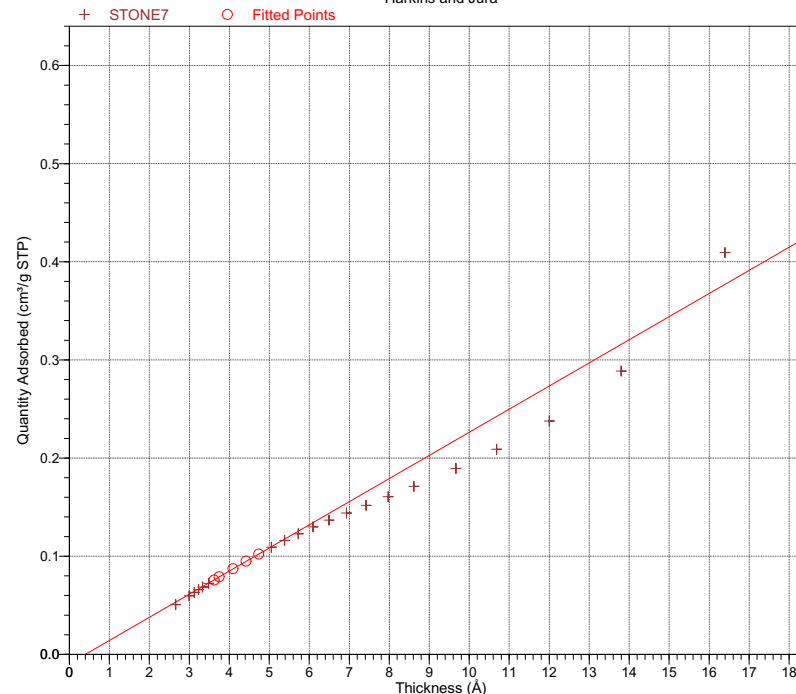
Sample: STONE7
 Operator:
 Submitter:
 File: D:\DATA\2020\EVA\STONE7.SMP

Started: 2010-08-26 16:10:34
 Completed: 2010-08-27 11:57:51
 Report Time: 2010-08-30 13:51:00
 Sample Mass: 11.1358 g
 Warm Free Space: 23.5373 cm³ Measured
 Equilibration Interval: 10 s
 Automatic Degas: Yes

Analysis Adsorptive: N2
 Analysis Bath Temp.: -195.692 °C
 Thermal Correction: No
 Smoothed Pressures: No
 Cold Free Space: 68.4897 cm³
 Low Pressure Dose: None

t-Plot

Harkins and Jura



* The micropore area is not reported because either the micropore volume is negative or the calculated external surface area is larger than the total surface area.



Sample: STONE7
 Operator:
 Submitter:
 File: D:\DATA\2020\EVA\STONE7.SMP

Started: 2010-08-26 16:10:34 Analysis Adsorptive: N2
 Completed: 2010-08-27 11:57:51 Analysis Bath Temp.: -195.692 °C
 Report Time: 2010-08-30 13:51:00 Thermal Correction: No
 Sample Mass: 11.1358 g Smoothed Pressures: No
 Warm Free Space: 23.5373 cm³ Measured Cold Free Space: 68.4897 cm³
 Equilibration Interval: 10 s Low Pressure Dose: None
 Automatic Degas: Yes

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

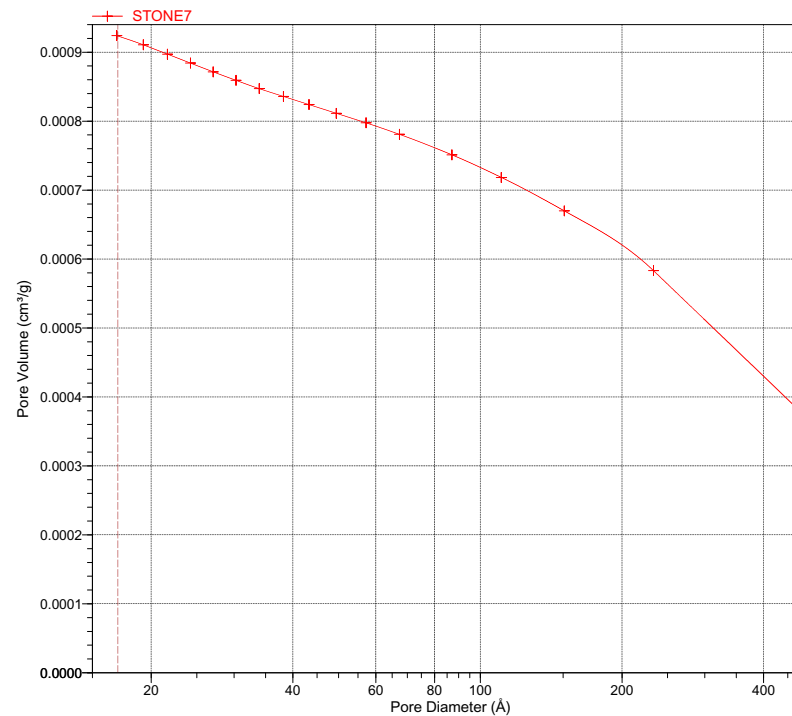
Pore Diameter Range (Å)	Average Diameter (Å)	Incremental Pore Volume (cm ³ /g)	Cumulative Pore Volume (cm ³ /g)	Incremental Pore Area (m ² /g)	Cumulative Pore Area (m ² /g)
1232.0 - 490.6	587.5	0.000372	0.000372	0.025	0.025
490.6 - 233.3	278.1	0.000211	0.000583	0.030	0.056
233.3 - 150.8	174.2	0.000087	0.000670	0.020	0.076
150.8 - 110.8	124.4	0.000048	0.000718	0.016	0.091
110.8 - 87.1	95.9	0.000033	0.000751	0.014	0.105
87.1 - 67.3	74.5	0.000030	0.000781	0.016	0.121
67.3 - 57.2	61.4	0.000017	0.000798	0.011	0.132
57.2 - 49.5	52.7	0.000014	0.000811	0.011	0.142
49.5 - 43.3	45.9	0.000013	0.000824	0.011	0.153
43.3 - 38.2	40.4	0.000012	0.000836	0.012	0.165
38.2 - 33.9	35.8	0.000011	0.000847	0.013	0.178
33.9 - 30.3	31.9	0.000012	0.000859	0.015	0.193
30.3 - 27.1	28.5	0.000012	0.000872	0.017	0.210
27.1 - 24.2	25.5	0.000013	0.000884	0.020	0.230
24.2 - 21.7	22.8	0.000013	0.000897	0.023	0.253
21.7 - 19.2	20.3	0.000013	0.000911	0.027	0.279
19.2 - 16.9	17.9	0.000013	0.000924	0.030	0.309



Sample: STONE7
 Operator:
 Submitter:
 File: D:\DATA\2020\EVA\STONE7.SMP

Started: 2010-08-26 16:10:34 Analysis Adsorptive: N2
 Completed: 2010-08-27 11:57:51 Analysis Bath Temp.: -195.692 °C
 Report Time: 2010-08-30 13:51:00 Thermal Correction: No
 Sample Mass: 11.1358 g Smoothed Pressures: No
 Warm Free Space: 23.5373 cm³ Measured Cold Free Space: 68.4897 cm³
 Equilibration Interval: 10 s Low Pressure Dose: None
 Automatic Degas: Yes

BJH Adsorption Cumulative Pore Volume





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Sample: STONE7
 Operator:
 Submitter:
 File: D:\DATA\2020\EVA\STONE7.SMP

Started: 2010-08-26 16:10:34 Analysis Adsorptive: N2
 Completed: 2010-08-27 11:57:51 Analysis Bath Temp.: -195.692 °C
 Report Time: 2010-08-30 13:51:00 Thermal Correction: No
 Sample Mass: 11.1358 g Smoothed Pressures: No
 Warm Free Space: 23.5373 cm³ Measured Cold Free Space: 68.4897 cm³
 Equilibration Interval: 10 s Low Pressure Dose: None
 Automatic Degas: Yes

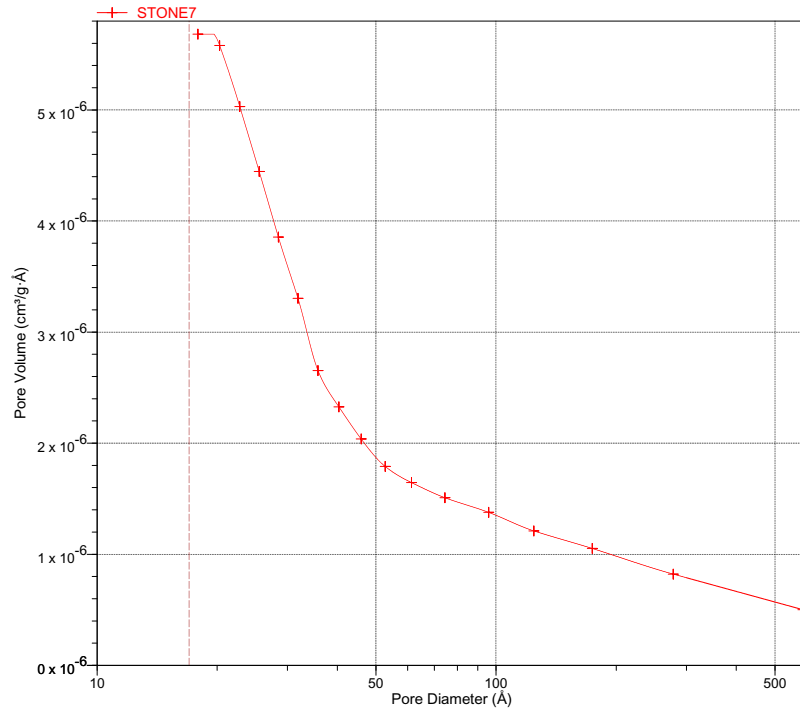


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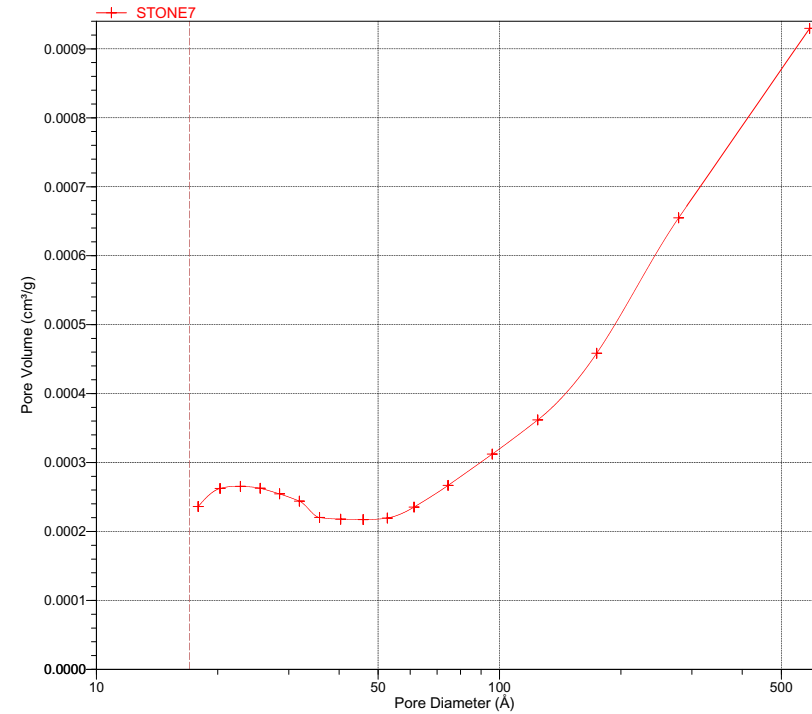
Sample: STONE7
 Operator:
 Submitter:
 File: D:\DATA\2020\EVA\STONE7.SMP

Started: 2010-08-26 16:10:34 Analysis Adsorptive: N2
 Completed: 2010-08-27 11:57:51 Analysis Bath Temp.: -195.692 °C
 Report Time: 2010-08-30 13:51:00 Thermal Correction: No
 Sample Mass: 11.1358 g Smoothed Pressures: No
 Warm Free Space: 23.5373 cm³ Measured Cold Free Space: 68.4897 cm³
 Equilibration Interval: 10 s Low Pressure Dose: None
 Automatic Degas: Yes

BJH Adsorption dV/dD Pore Volume



BJH Adsorption dV/dlog(D) Pore Volume





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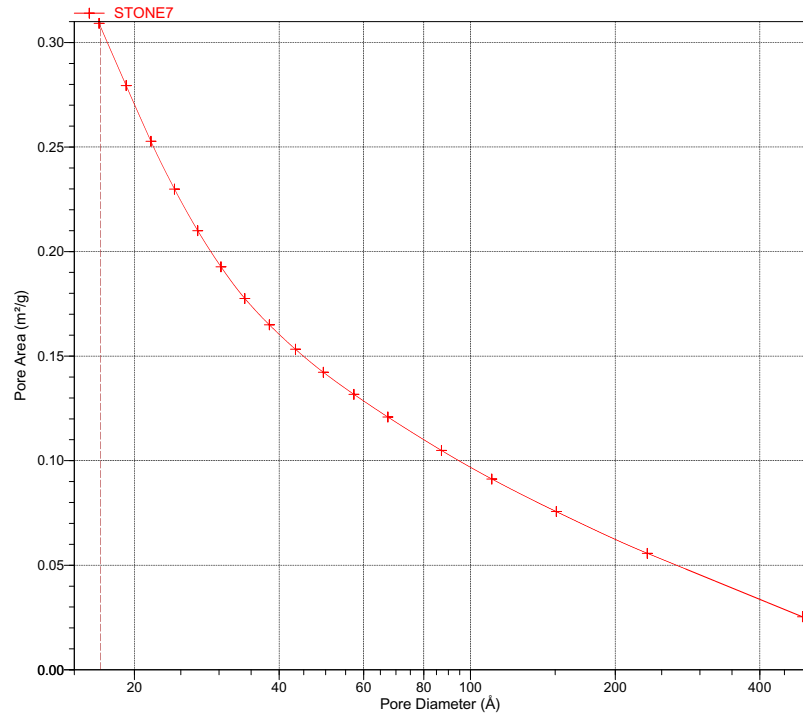
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Sample: STONE7
Operator:
Submitter:
File: D:\DATA\2020\EVA\STONE7.SMP

Started: 2010-08-26 16:10:34
Completed: 2010-08-27 11:57:51
Report Time: 2010-08-30 13:51:00
Sample Mass: 11.1358 g
Warm Free Space: 23.5373 cm³ Measured
Equilibration Interval: 10 s
Automatic Degas: Yes

Analysis Adsorptive: N2
Analysis Bath Temp.: -195.692 °C
Thermal Correction: No
Smoothed Pressures: No
Cold Free Space: 68.4897 cm³
Low Pressure Dose: None

BJH Adsorption Cumulative Pore Area



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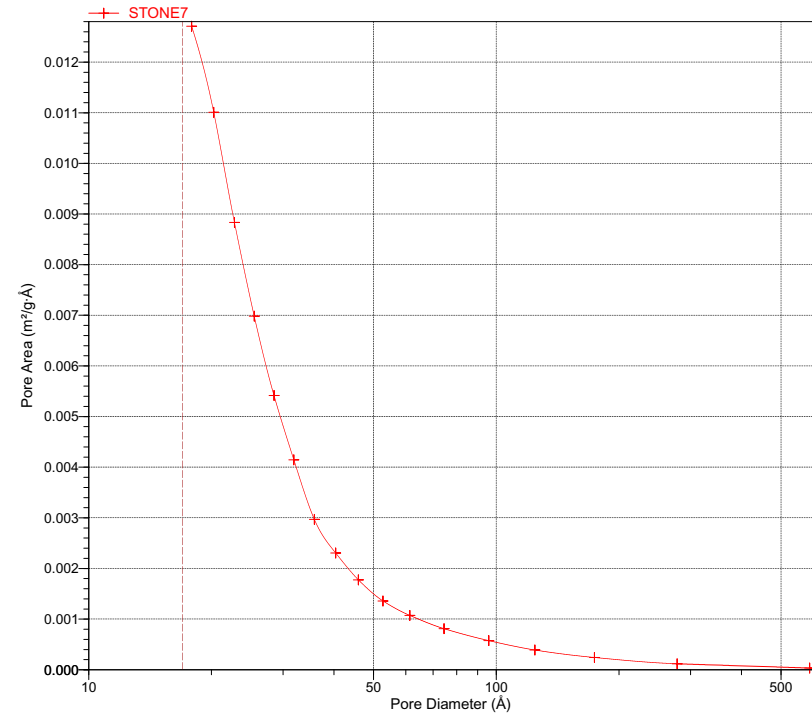
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Sample: STONE7
Operator:
Submitter:
File: D:\DATA\2020\EVA\STONE7.SMP

Started: 2010-08-26 16:10:34
Completed: 2010-08-27 11:57:51
Report Time: 2010-08-30 13:51:00
Sample Mass: 11.1358 g
Warm Free Space: 23.5373 cm³ Measured
Equilibration Interval: 10 s
Automatic Degas: Yes

Analysis Adsorptive: N2
Analysis Bath Temp.: -195.692 °C
Thermal Correction: No
Smoothed Pressures: No
Cold Free Space: 68.4897 cm³
Low Pressure Dose: None

BJH Adsorption dA/dD Pore Area





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Sample: STONE7
 Operator:
 Submitter:
 File: D:\DATA\2020\EVA\STONE7.SMP

Started: 2010-08-26 16:10:34 Analysis Adsorptive: N2
 Completed: 2010-08-27 11:57:51 Analysis Bath Temp.: -195.692 °C
 Report Time: 2010-08-30 13:51:00 Thermal Correction: No
 Sample Mass: 11.1358 g Smoothed Pressures: No
 Warm Free Space: 23.5373 cm³ Measured Cold Free Space: 68.4897 cm³
 Equilibration Interval: 10 s Low Pressure Dose: None
 Automatic Degas: Yes

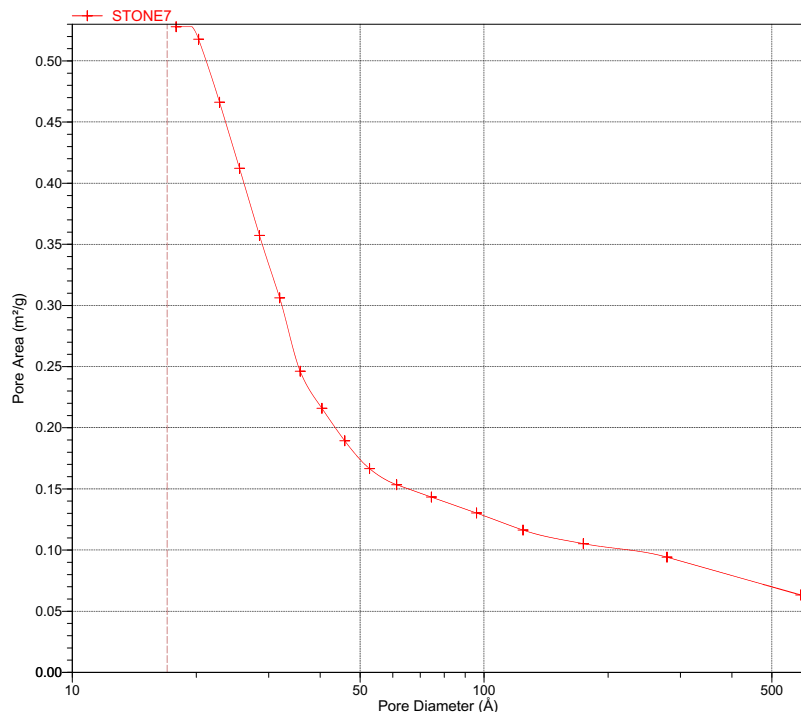


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Sample: STONE7
 Operator:
 Submitter:
 File: D:\DATA\2020\EVA\STONE7.SMP

Started: 2010-08-26 16:10:34 Analysis Adsorptive: N2
 Completed: 2010-08-27 11:57:51 Analysis Bath Temp.: -195.692 °C
 Report Time: 2010-08-30 13:51:00 Thermal Correction: No
 Sample Mass: 11.1358 g Smoothed Pressures: No
 Warm Free Space: 23.5373 cm³ Measured Cold Free Space: 68.4897 cm³
 Equilibration Interval: 10 s Low Pressure Dose: None
 Automatic Degas: Yes

BJH Adsorption dA/dlog(D) Pore Area



Horvath-Kawazoe Report

Slit Pore Geometry (Original H-K)

Maximum Pore Volume: 0.000966 cm³/g
 at Relative Pressure: 0.984076880
 Median Pore Width: 456.503 Å
 Relative Pressure Range: 1.142e-02 to 9.841e-01

Diameter of Adsorptive Molecule: 3.000 Å
 Diameter of Adsorptive at Zero Interaction Energy: 2.574 Å
 Diameter of Sample Atom: 3.040 Å
 Diameter of Sample Atom at Zero Interaction Energy: 2.609 Å
 Interaction Parameter: 3.49e-43 erg·cm⁴

Density Conversion Factor: 0.0015468

Absolute Pressure (mmHg)	Relative Pressure (p/p [*])	Quantity Adsorbed (cm ³ /g STP)	Pore Width (Å)	Cumulative Pore Volume (cm ³ /g)	Differential Pore Volume (cm ³ /g·Å)
8.78805	0.011420284	0.0507	10.446	0.0001	0.0000
23.08600	0.030000650	0.0597	12.614	0.0001	0.0000
30.90996	0.040167827	0.0632	13.518	0.0001	0.0000
38.00365	0.049385928	0.0658	14.263	0.0001	0.0000
45.89022	0.059634298	0.0686	15.036	0.0001	0.0000
58.40199	0.075893098	0.0724	16.186	0.0001	0.0000
71.19873	0.092521979	0.0758	17.301	0.0001	0.0000
83.77799	0.108868263	0.0790	18.359	0.0001	0.0000
121.58998	0.158003664	0.0872	21.504	0.0001	0.0000
159.87021	0.207747081	0.0948	24.744	0.0001	0.0000
197.80405	0.257039923	0.1021	28.161	0.0002	0.0000
235.66890	0.306243137	0.1092	31.906	0.0002	0.0000
273.61871	0.355555916	0.1161	36.099	0.0002	0.0000
311.55011	0.404843698	0.1229	40.835	0.0002	0.0000
349.52307	0.454185583	0.1299	46.319	0.0002	0.0000
387.48444	0.503512713	0.1367	52.835	0.0002	0.0000
425.49942	0.552907539	0.1440	60.713	0.0002	0.0000
463.50604	0.602290900	0.1519	70.403	0.0002	0.0000
501.29126	0.651387941	0.1607	82.889	0.0002	0.0000
539.19720	0.700641560	0.1711	99.215	0.0003	0.0000
589.62543	0.766165317	0.1893	131.937	0.0003	0.0000
627.71832	0.815659899	0.2090	171.080	0.0003	0.0000
665.48602	0.864732786	0.2378	238.987	0.0004	0.0000
702.74060	0.913137238	0.2886	381.783	0.0004	0.0000
738.28809	0.959321616	0.4092	843.571	0.0006	0.0000
757.34534	0.984076880	0.6244	2028.827	0.0010	0.0000



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Sample: STONE7
 Operator:
 Submitter:
 File: D:\DATA\2020\EVA\STONE7.SMP

Started: 2010-08-26 16:10:34
 Completed: 2010-08-27 11:57:51
 Report Time: 2010-08-30 13:51:00
 Sample Mass: 11.1358 g
 Warm Free Space: 23.5373 cm³ Measured
 Equilibration Interval: 10 s
 Automatic Degas: Yes

Analysis Adsorptive: N2
 Analysis Bath Temp.: -195.692 °C
 Thermal Correction: No
 Smoothed Pressures: No
 Cold Free Space: 68.4897 cm³
 Low Pressure Dose: None



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Unit 1

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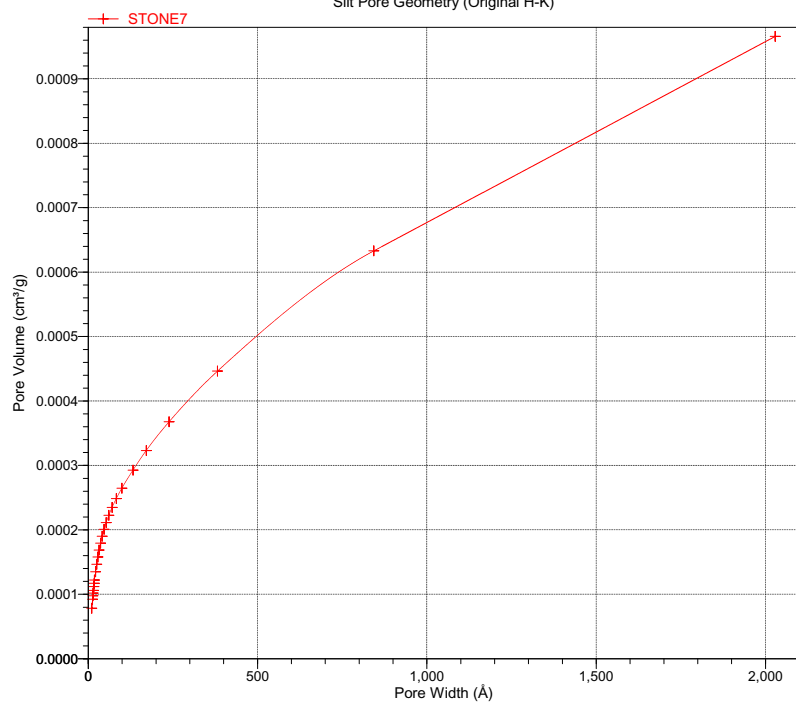
Sample: STONE7
 Operator:
 Submitter:
 File: D:\DATA\2020\EVA\STONE7.SMP

Started: 2010-08-26 16:10:34
 Completed: 2010-08-27 11:57:51
 Report Time: 2010-08-30 13:51:00
 Sample Mass: 11.1358 g
 Warm Free Space: 23.5373 cm³ Measured
 Equilibration Interval: 10 s
 Automatic Degas: Yes

Analysis Adsorptive: N2
 Analysis Bath Temp.: -195.692 °C
 Thermal Correction: No
 Smoothed Pressures: No
 Cold Free Space: 68.4897 cm³
 Low Pressure Dose: None

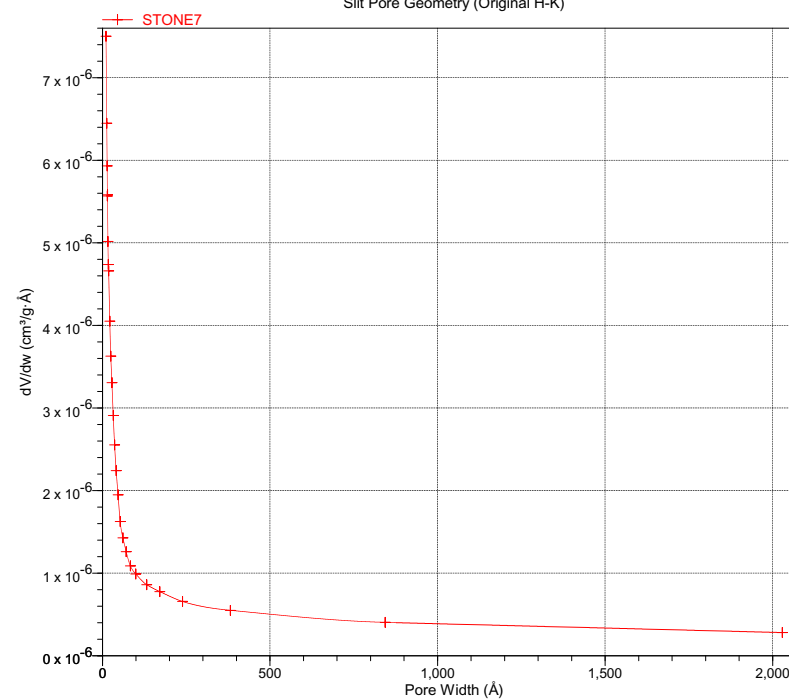
Horvath-Kawazoe Cumulative Pore Volume Plot

Slit Pore Geometry (Original H-K)



Horvath-Kawazoe Differential Pore Volume Plot

Slit Pore Geometry (Original H-K)





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Serial #: 182

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Sample: STONE7
 Operator:
 Submitter:
 File: D:\DATA\2020\EVA\STONE7.SMP

Started: 2010-08-26 16:10:34
 Completed: 2010-08-27 11:57:51
 Report Time: 2010-08-30 13:51:00
 Sample Mass: 11.1358 g
 Warm Free Space: 23.5373 cm³ Measured
 Equilibration Interval: 10 s
 Automatic Degas: Yes

Analysis Adsorptive: N2
 Analysis Bath Temp.: -195.692 °C
 Thermal Correction: No
 Smoothed Pressures: No
 Cold Free Space: 68.4897 cm³
 Low Pressure Dose: None

Summary Report

Surface Area

Single point surface area at $p/p^* = 0.306243137$: 0.3296 m²/g

BET Surface Area: 0.3369 m²/g

t-Plot External Surface Area: 0.3645 m²/g

BJH Adsorption cumulative surface area of pores
 between 17.000 Å and 3000.000 Å diameter: 0.3092 m²/g

BJH Desorption cumulative surface area of pores
 between 17.000 Å and 3000.000 Å diameter: 0.4294 m²/g

Pore Volume

Single point adsorption total pore volume of pores
 less than 1235.3483 Å at $p/p^* = 0.984076880$: 0.000966 cm³/g

t-Plot micropore volume: -0.000014 cm³/g

BJH Adsorption cumulative volume of pores
 between 17.000 Å and 3000.000 Å diameter: 0.000924 cm³/g

BJH Desorption cumulative volume of pores
 between 17.000 Å and 3000.000 Å diameter: 0.000514 cm³/g

Pore Size

Adsorption average pore width (4V/A by BET): 114.6636 Å

BJH Adsorption average pore diameter (4V/A): 119.546 Å

BJH Desorption average pore diameter (4V/A): 47.848 Å

Horvath-Kawazoe

Maximum pore volume at $p/p^* = 0.984076880$: 0.000966 cm³/g

Median pore width: 456.5032 Å

Dubinin-Radushkevich

Micropore surface area: 0.0000 m²/g

Monolayer capacity: 0.000000 cm³/g

Dubinin-Astakhov

Micropore surface area: 0.3307 m²/g

Limiting micropore volume: 0.000173 cm³/g



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Sample: STONE7
 Operator:
 Submitter:
 File: D:\DATA\2020\EVA\STONE7.SMP

Started: 2010-08-26 16:10:34
 Completed: 2010-08-27 11:57:51
 Report Time: 2010-08-30 13:51:00
 Sample Mass: 11.1358 g
 Warm Free Space: 23.5373 cm³ Measured
 Equilibration Interval: 10 s
 Automatic Degas: Yes

Analysis Adsorptive: N2
 Analysis Bath Temp.: -195.692 °C
 Thermal Correction: No
 Smoothed Pressures: No
 Cold Free Space: 68.4897 cm³
 Low Pressure Dose: None

Dubinin-Astakhov

MP-Method

Cumulative surface area of pores between
 18.4787 Å and 18.4787 Å hydraulic radius: 0.0000 m²/g

Cumulative pore volume of pores between
 18.4787 Å and 18.4787 Å hydraulic radius: 0.000000 cm³/g

Average pore hydraulic radius (V/A): 0.0000 Å

A2.7 N₂ adsorption isotherms (as referenced to in Section 3.2.1) for the M sample size fraction 0.5–1 mm



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Sample: STONE4
 Operator:
 Submitter:
 File: D:\DATA\2020\EVA\STONE4.SMP

Sample: STONE4
 Operator:
 Submitter:
 File: D:\DATA\2020\EVA\STONE4.SMP

Started: 2010-08-18 15:10:05
 Completed: 2010-08-18 20:57:59
 Report Time: 2010-08-30 13:51:55
 Sample Mass: 11.8628 g
 Warm Free Space: 23.4907 cm³ Measured
 Equilibration Interval: 10 s
 Automatic Degas: Yes

Analysis Adsorptive: N2
 Analysis Bath Temp.: -195.755 °C
 Thermal Correction: No
 Smoothed Pressures: No
 Cold Free Space: 68.4359 cm³
 Low Pressure Dose: None

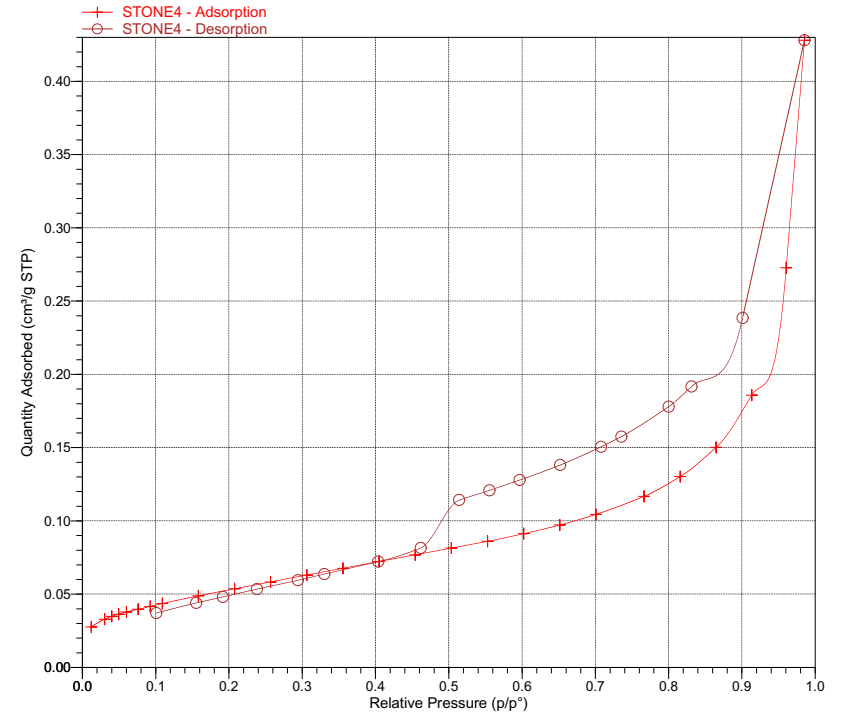
Started: 2010-08-18 15:10:05
 Completed: 2010-08-18 20:57:59
 Report Time: 2010-08-30 13:51:55
 Sample Mass: 11.8628 g
 Warm Free Space: 23.4907 cm³ Measured
 Equilibration Interval: 10 s
 Automatic Degas: Yes

Analysis Adsorptive: N2
 Analysis Bath Temp.: -195.755 °C
 Thermal Correction: No
 Smoothed Pressures: No
 Cold Free Space: 68.4359 cm³
 Low Pressure Dose: None

Isotherm Tabular Report

Relative Pressure (p/p ^o)	Absolute Pressure (mmHg)	Quantity Adsorbed (cm ³ /g STP)	Elapsed Time (h:min)	Saturation Pressure (mmHg)
			01:45	764.07812
0.011974025	9.14410	0.0277	03:35	
0.030423055	23.23256	0.0329	03:38	
0.040211879	30.70734	0.0348	03:41	
0.049497503	37.79764	0.0364	03:44	
0.059947481	45.77684	0.0379	03:47	
			03:50	763.60443
0.076049645	58.07185	0.0396	03:52	
0.092483481	70.62080	0.0416	03:54	
0.108946063	83.19170	0.0436	03:56	
0.158191450	120.79569	0.0489	04:00	
0.207743451	158.63382	0.0537	04:03	
0.256814041	196.10434	0.0584	04:05	
0.306216622	233.82837	0.0631	04:08	
0.355537753	271.49020	0.0677	04:10	
0.404903686	309.18625	0.0723	04:14	
0.454212988	346.83905	0.0769	04:17	
0.503520012	384.49011	0.0815	04:19	
0.552804456	422.12393	0.0861	04:22	
0.602108602	459.77280	0.0913	04:24	
0.651493159	497.48306	0.0972	04:27	
0.700757620	535.10162	0.1045	04:29	
0.766437733	585.25525	0.1168	04:31	
0.815667704	622.84747	0.1303	04:34	
0.864837248	660.39355	0.1502	04:36	
0.913619929	697.64423	0.1858	04:38	
0.960353836	733.33044	0.2727	04:41	
0.985310403	752.38739	0.4280	04:46	
0.901041212	688.03906	0.2385	04:49	
0.831133664	634.65735	0.1917	04:52	
0.800106707	610.96503	0.1780	04:54	
0.735464329	561.60382	0.1576	04:57	
0.707883968	540.54333	0.1506	05:00	
0.652115216	497.95807	0.1382	05:03	
0.596802947	455.72137	0.1279	05:05	
0.555619162	424.27325	0.1209	05:08	
0.514158459	392.61368	0.1142	05:11	
0.461646229	352.51511	0.0815	05:14	
0.403482964	308.10138	0.0722	05:17	
0.330227474	252.16316	0.0637	05:20	
0.293915663	224.43530	0.0595	05:23	
0.238286649	181.95674	0.0535	05:25	
0.191824845	146.47830	0.0482	05:27	
0.155430547	118.68745	0.0440	05:30	
0.100884269	77.03568	0.0371	05:33	

Isotherm Linear Plot





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Sample: STONE4
 Operator:
 Submitter:
 File: D:\DATA\2020\EVA\STONE4.SMP

Started: 2010-08-18 15:10:05 Analysis Adsorptive: N2
 Completed: 2010-08-18 20:57:59 Analysis Bath Temp.: -195.755 °C
 Report Time: 2010-08-30 13:51:55 Thermal Correction: No
 Sample Mass: 11.8628 g Smoothed Pressures: No
 Warm Free Space: 23.4907 cm³ Measured Cold Free Space: 68.4359 cm³
 Equilibration Interval: 10 s Low Pressure Dose: None
 Automatic Degas: Yes

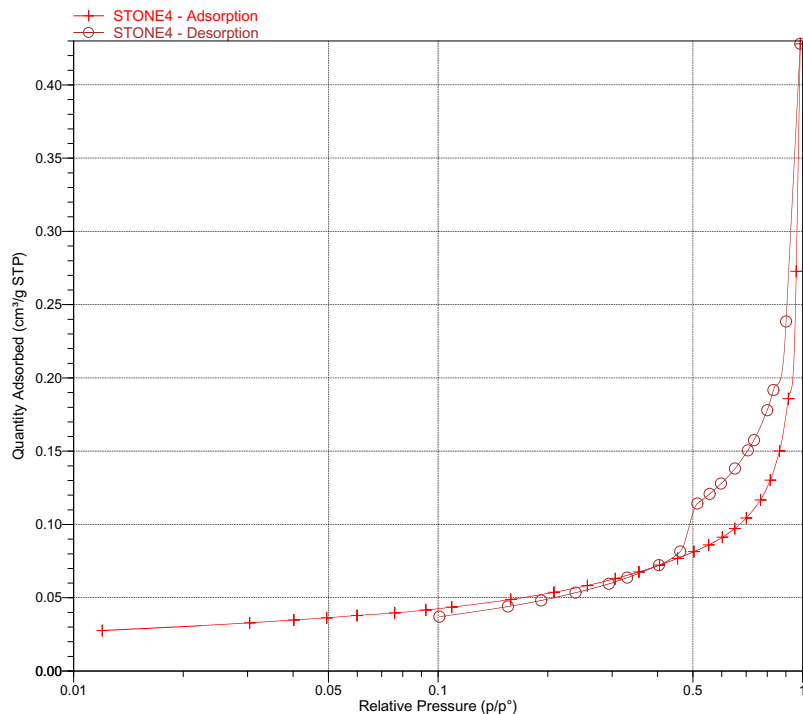


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Sample: STONE4
 Operator:
 Submitter:
 File: D:\DATA\2020\EVA\STONE4.SMP

Started: 2010-08-18 15:10:05 Analysis Adsorptive: N2
 Completed: 2010-08-18 20:57:59 Analysis Bath Temp.: -195.755 °C
 Report Time: 2010-08-30 13:51:55 Thermal Correction: No
 Sample Mass: 11.8628 g Smoothed Pressures: No
 Warm Free Space: 23.4907 cm³ Measured Cold Free Space: 68.4359 cm³
 Equilibration Interval: 10 s Low Pressure Dose: None
 Automatic Degas: Yes

Isotherm Log Plot



BET Surface Area Report

BET Surface Area: 0.1979 ± 0.0012 m²/g
 Slope: 21.570809 ± 0.125629 g/cm³ STP
 Y-Intercept: 0.424181 ± 0.025954 g/cm³ STP
 C: 51.852851
 Qm: 0.0455 cm³/g STP
 Correlation Coefficient: 0.9998813
 Molecular Cross-Sectional Area: 0.1620 nm²

Relative Pressure (p/p°)	Quantity Adsorbed (cm ³ /g STP)	1/[Q(p°/p - 1)]
0.059947481	0.0379	1.680881
0.076049645	0.0396	2.075915
0.092483481	0.0416	2.447439
0.108946063	0.0436	2.805340
0.158191450	0.0489	3.846216
0.207743451	0.0537	4.882088
0.256814041	0.0584	5.920165
0.306216622	0.0631	6.995680
0.355537753	0.0677	8.150245



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Unit 1

Serial #: 182

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Sample: STONE4
Operator:
Submitter:
File: D:\DATA\2020\EVA\STONE4.SMP

Started: 2010-08-18 15:10:05
Completed: 2010-08-18 20:57:59
Report Time: 2010-08-30 13:51:55
Sample Mass: 11.8628 g
Warm Free Space: 23.4907 cm³ Measured
Equilibration Interval: 10 s
Automatic Degas: Yes

Analysis Adsorptive: N2
Analysis Bath Temp.: -195.755 °C
Thermal Correction: No
Smoothed Pressures: No
Cold Free Space: 68.4359 cm³
Low Pressure Dose: None



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Unit 1

Serial #: 182

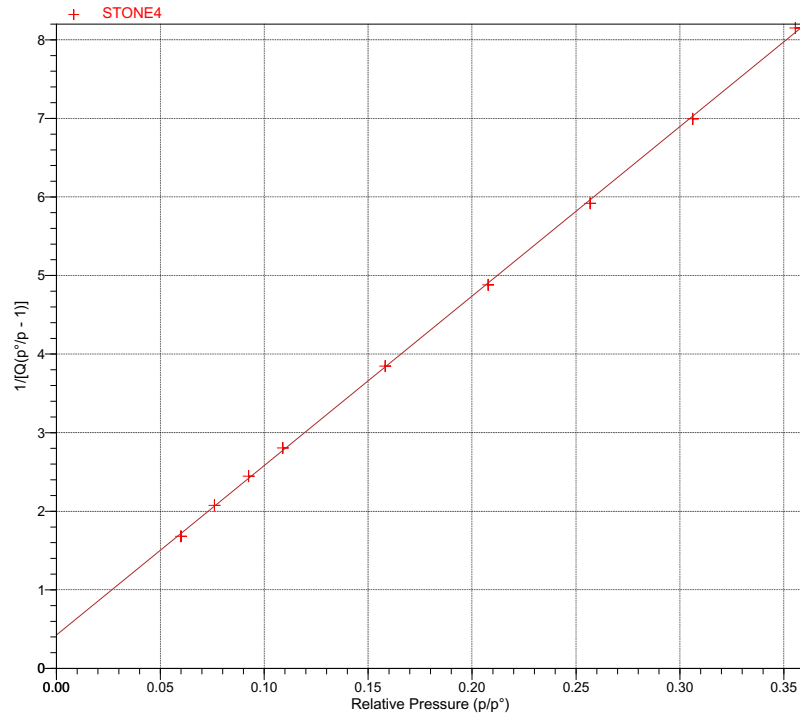
Page 6

Sample: STONE4
Operator:
Submitter:
File: D:\DATA\2020\EVA\STONE4.SMP

Started: 2010-08-18 15:10:05
Completed: 2010-08-18 20:57:59
Report Time: 2010-08-30 13:51:55
Sample Mass: 11.8628 g
Warm Free Space: 23.4907 cm³ Measured
Equilibration Interval: 10 s
Automatic Degas: Yes

Analysis Adsorptive: N2
Analysis Bath Temp.: -195.755 °C
Thermal Correction: No
Smoothed Pressures: No
Cold Free Space: 68.4359 cm³
Low Pressure Dose: None

BET Surface Area Plot



Langmuir Reports

Primary Data
4052- Fewer than two points are selected for this report.



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Sample: STONE4
 Operator:
 Submitter:
 File: D:\DATA\2020\EVA\STONE4.SMP

Started: 2010-08-18 15:10:05 Analysis Adsorptive: N2
 Completed: 2010-08-18 20:57:59 Analysis Bath Temp.: -195.755 °C
 Report Time: 2010-08-30 13:51:55 Thermal Correction: No
 Sample Mass: 11.8628 g Smoothed Pressures: No
 Warm Free Space: 23.4907 cm³ Measured Cold Free Space: 68.4359 cm³
 Equilibration Interval: 10 s Low Pressure Dose: None
 Automatic Degas: Yes

t-Plot Report

Micropore Volume: -0.000020 cm³/g STP
 Micropore Area: *
 External Surface Area: 0.2323 m²/g
 Slope: 0.015020 ± 0.000053 cm³/g·Å STP
 Y-Intercept: -0.012685 ± 0.000218 cm³/g STP
 Correlation Coefficient: 0.999982
 Surface Area Correction Factor: 1.000
 Density Conversion Factor: 0.0015468
 Total Surface Area (BET): 0.1979 m²/g
 Thickness Range: 3.5000 Å to 5.0000 Å
 Thickness Equation: Harkins and Jura
 $t = [13.99 / (0.034 - \log(p/p^*))] ^ 0.5$

Relative Pressure (p/p [*])	Statistical Thickness (Å)	Quantity Adsorbed (cm ³ /g STP)
0.011974025	2.6746	0.0277
0.030423055	3.0035	0.0329
0.040211879	3.1282	0.0348
0.049497503	3.2318	0.0364
0.059947481	3.3371	0.0379
0.076049645	3.4835	0.0396
0.092483481	3.6194	0.0416
0.108946063	3.7463	0.0436
0.158191450	4.0937	0.0489
0.207743451	4.4188	0.0537
0.256814041	4.7335	0.0584
0.306216622	5.0528	0.0631
0.355537753	5.3813	0.0677
0.404903686	5.7263	0.0723
0.454212988	6.0938	0.0769
0.503520012	6.4916	0.0815
0.552804456	6.9286	0.0861
0.602108602	7.4168	0.0913
0.651493159	7.9728	0.0972
0.700757620	8.6165	0.1045
0.766437733	9.6729	0.1168
0.815667704	10.6872	0.1303
0.864837248	12.0054	0.1502
0.913619929	13.8214	0.1858
0.960353836	16.4708	0.2727
0.985310403	18.6026	0.4280

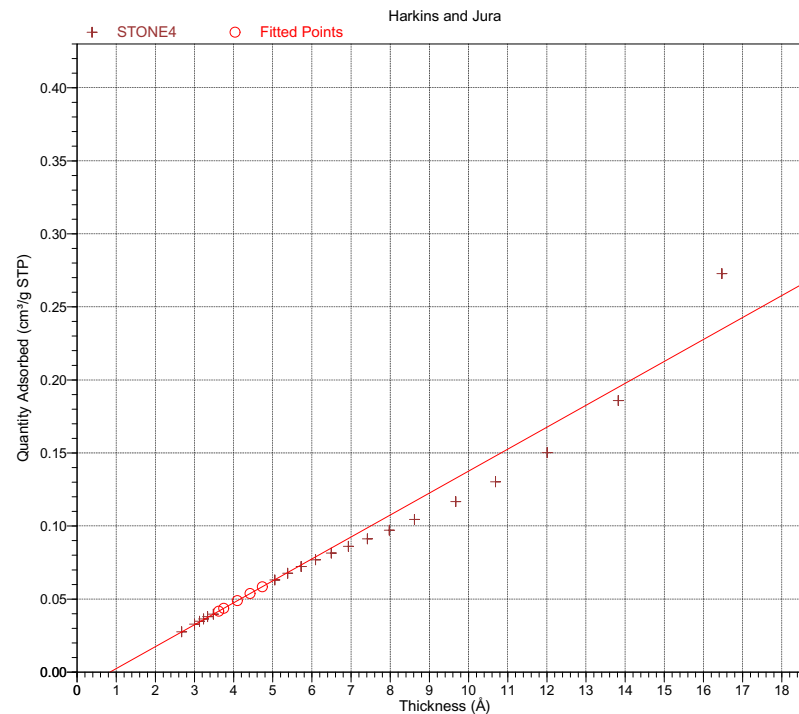


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Sample: STONE4
 Operator:
 Submitter:
 File: D:\DATA\2020\EVA\STONE4.SMP

Started: 2010-08-18 15:10:05 Analysis Adsorptive: N2
 Completed: 2010-08-18 20:57:59 Analysis Bath Temp.: -195.755 °C
 Report Time: 2010-08-30 13:51:55 Thermal Correction: No
 Sample Mass: 11.8628 g Smoothed Pressures: No
 Warm Free Space: 23.4907 cm³ Measured Cold Free Space: 68.4359 cm³
 Equilibration Interval: 10 s Low Pressure Dose: None
 Automatic Degas: Yes

t-Plot



* The micropore area is not reported because either the micropore volume is negative or the calculated external surface area is larger than the total surface area.



Sample: STONE4
 Operator:
 Submitter:
 File: D:\DATA\2020\EVA\STONE4.SMP

Started: 2010-08-18 15:10:05 Analysis Adsorptive: N2
 Completed: 2010-08-18 20:57:59 Analysis Bath Temp.: -195.755 °C
 Report Time: 2010-08-30 13:51:55 Thermal Correction: No
 Sample Mass: 11.8628 g Smoothed Pressures: No
 Warm Free Space: 23.4907 cm³ Measured Cold Free Space: 68.4359 cm³
 Equilibration Interval: 10 s Low Pressure Dose: None
 Automatic Degas: Yes

BJH Adsorption Pore Distribution Report

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

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

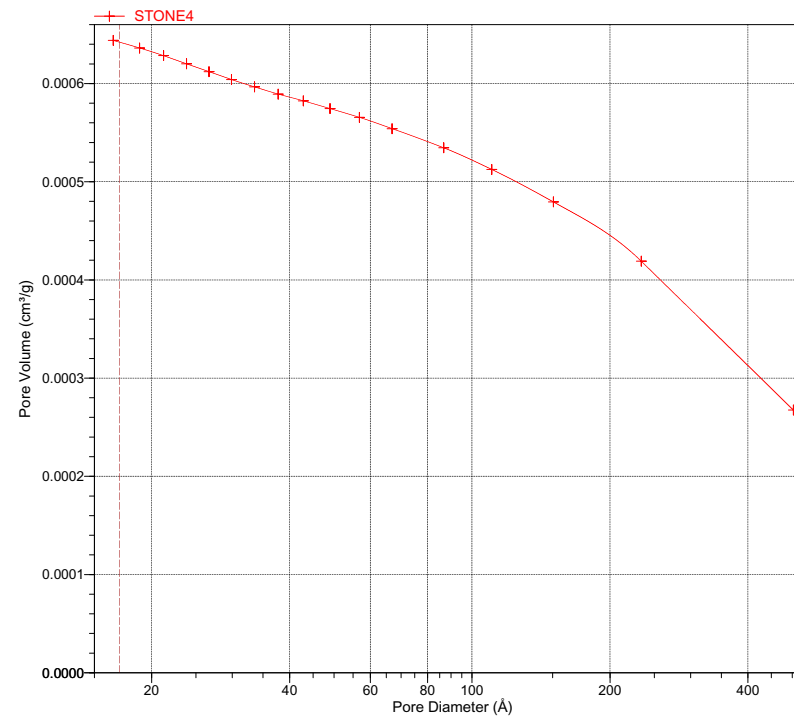
Pore Diameter Range (Å)	Average Diameter (Å)	Incremental Pore Volume (cm³/g)	Cumulative Pore Volume (cm³/g)	Incremental Pore Area (m²/g)	Cumulative Pore Area (m²/g)
1333.5 - 502.7	601.3	0.000267	0.000267	0.018	0.018
502.7 - 234.2	279.4	0.000152	0.000419	0.022	0.039
234.2 - 150.5	174.0	0.000060	0.000479	0.014	0.053
150.5 - 110.4	124.0	0.000033	0.000513	0.011	0.064
110.4 - 86.7	95.5	0.000022	0.000535	0.009	0.073
86.7 - 67.0	74.1	0.000020	0.000554	0.011	0.084
67.0 - 56.8	61.0	0.000011	0.000566	0.008	0.091
56.8 - 49.0	52.3	0.000009	0.000575	0.007	0.098
49.0 - 42.8	45.5	0.000008	0.000582	0.007	0.105
42.8 - 37.8	40.0	0.000007	0.000589	0.007	0.112
37.8 - 33.5	35.4	0.000007	0.000597	0.008	0.120
33.5 - 29.9	31.5	0.000007	0.000604	0.010	0.130
29.9 - 26.7	28.1	0.000008	0.000612	0.011	0.141
26.7 - 23.8	25.1	0.000008	0.000620	0.013	0.154
23.8 - 21.2	22.4	0.000008	0.000628	0.015	0.169
21.2 - 18.8	19.9	0.000008	0.000636	0.016	0.185
18.8 - 16.5	17.5	0.000008	0.000644	0.018	0.202



Sample: STONE4
 Operator:
 Submitter:
 File: D:\DATA\2020\EVA\STONE4.SMP

Started: 2010-08-18 15:10:05 Analysis Adsorptive: N2
 Completed: 2010-08-18 20:57:59 Analysis Bath Temp.: -195.755 °C
 Report Time: 2010-08-30 13:51:55 Thermal Correction: No
 Sample Mass: 11.8628 g Smoothed Pressures: No
 Warm Free Space: 23.4907 cm³ Measured Cold Free Space: 68.4359 cm³
 Equilibration Interval: 10 s Low Pressure Dose: None
 Automatic Degas: Yes

BJH Adsorption Cumulative Pore Volume





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Sample: STONE4
 Operator:
 Submitter:
 File: D:\DATA\2020\EVA\STONE4.SMP

Started: 2010-08-18 15:10:05 Analysis Adsorptive: N2
 Completed: 2010-08-18 20:57:59 Analysis Bath Temp.: -195.755 °C
 Report Time: 2010-08-30 13:51:55 Thermal Correction: No
 Sample Mass: 11.8628 g Smoothed Pressures: No
 Warm Free Space: 23.4907 cm³ Measured Cold Free Space: 68.4359 cm³
 Equilibration Interval: 10 s Low Pressure Dose: None
 Automatic Degas: Yes

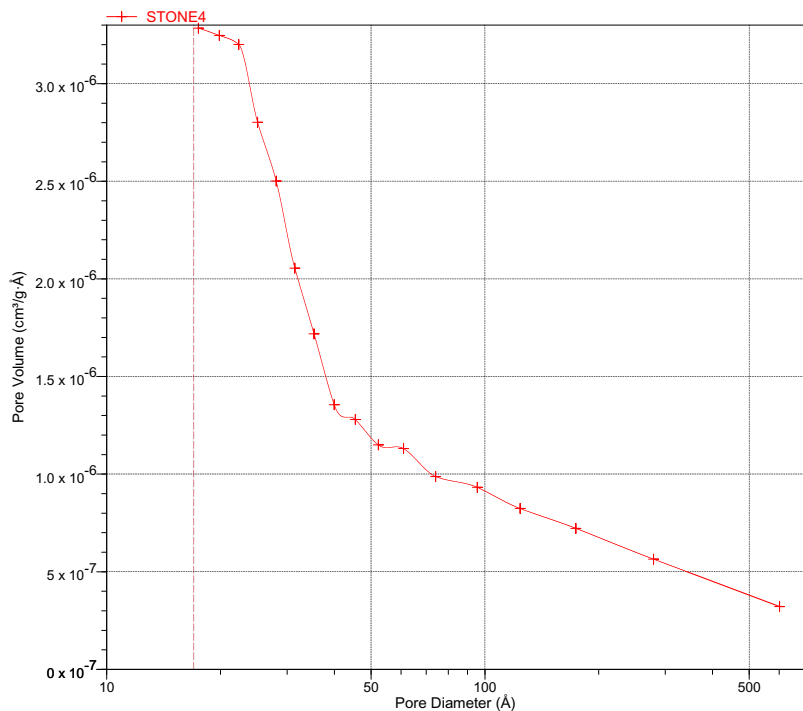


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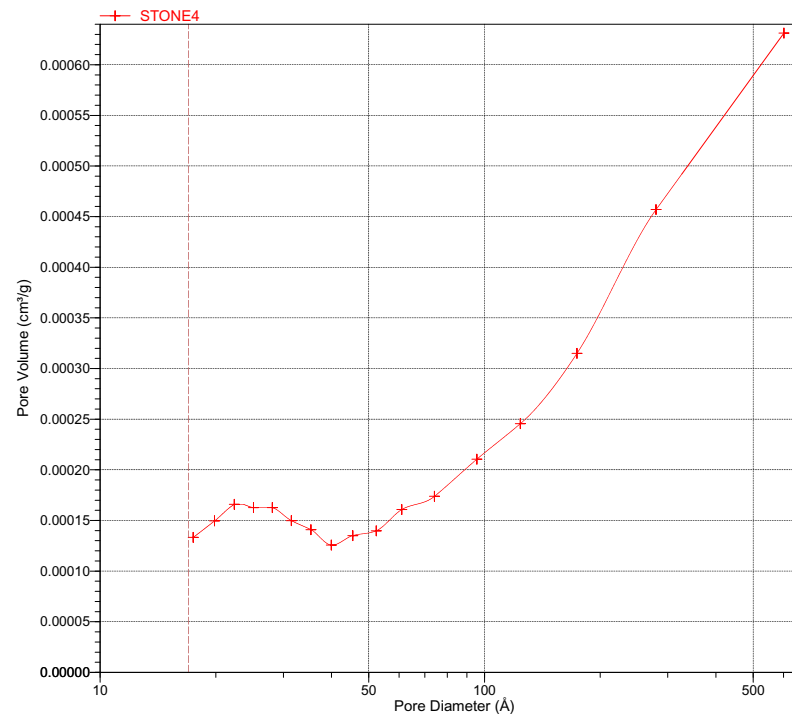
Sample: STONE4
 Operator:
 Submitter:
 File: D:\DATA\2020\EVA\STONE4.SMP

Started: 2010-08-18 15:10:05 Analysis Adsorptive: N2
 Completed: 2010-08-18 20:57:59 Analysis Bath Temp.: -195.755 °C
 Report Time: 2010-08-30 13:51:55 Thermal Correction: No
 Sample Mass: 11.8628 g Smoothed Pressures: No
 Warm Free Space: 23.4907 cm³ Measured Cold Free Space: 68.4359 cm³
 Equilibration Interval: 10 s Low Pressure Dose: None
 Automatic Degas: Yes

BJH Adsorption dV/dD Pore Volume



BJH Adsorption dV/dlog(D) Pore Volume





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Unit 1

Serial #: 182

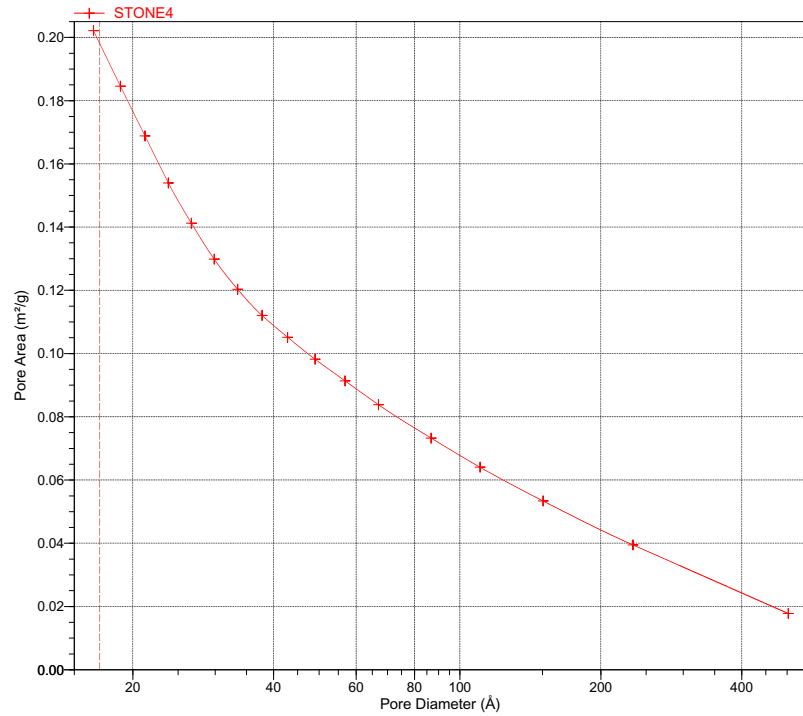
Page 13

Sample: STONE4
 Operator:
 Submitter:
 File: D:\DATA\2020\EVA\STONE4.SMP

Started: 2010-08-18 15:10:05
 Completed: 2010-08-18 20:57:59
 Report Time: 2010-08-30 13:51:55
 Sample Mass: 11.8628 g
 Warm Free Space: 23.4907 cm³ Measured
 Equilibration Interval: 10 s
 Automatic Degas: Yes

Analysis Adsorptive: N2
 Analysis Bath Temp.: -195.755 °C
 Thermal Correction: No
 Smoothed Pressures: No
 Cold Free Space: 68.4359 cm³
 Low Pressure Dose: None

BJH Adsorption Cumulative Pore Area



ASAP 2020 V1.05 H

Unit 1

Serial #: 182

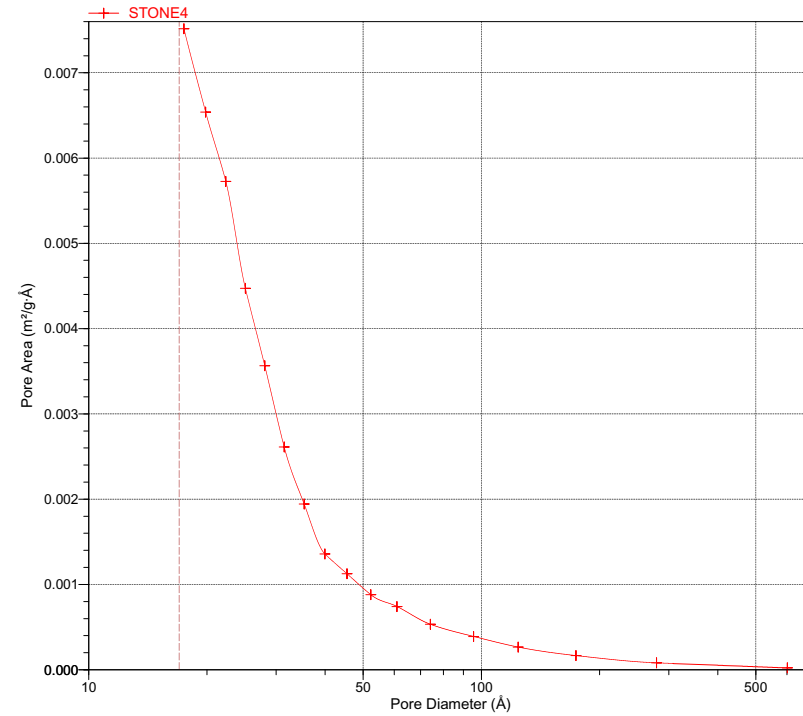
Page 14

Sample: STONE4
 Operator:
 Submitter:
 File: D:\DATA\2020\EVA\STONE4.SMP

Started: 2010-08-18 15:10:05
 Completed: 2010-08-18 20:57:59
 Report Time: 2010-08-30 13:51:55
 Sample Mass: 11.8628 g
 Warm Free Space: 23.4907 cm³ Measured
 Equilibration Interval: 10 s
 Automatic Degas: Yes

Analysis Adsorptive: N2
 Analysis Bath Temp.: -195.755 °C
 Thermal Correction: No
 Smoothed Pressures: No
 Cold Free Space: 68.4359 cm³
 Low Pressure Dose: None

BJH Adsorption dA/dD Pore Area





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Sample: STONE4
 Operator:
 Submitter:
 File: D:\DATA\2020\EVA\STONE4.SMP

Started: 2010-08-18 15:10:05 Analysis Adsorptive: N2
 Completed: 2010-08-18 20:57:59 Analysis Bath Temp.: -195.755 °C
 Report Time: 2010-08-30 13:51:55 Thermal Correction: No
 Sample Mass: 11.8628 g Smoothed Pressures: No
 Warm Free Space: 23.4907 cm³ Measured Cold Free Space: 68.4359 cm³
 Equilibration Interval: 10 s Low Pressure Dose: None
 Automatic Degas: Yes

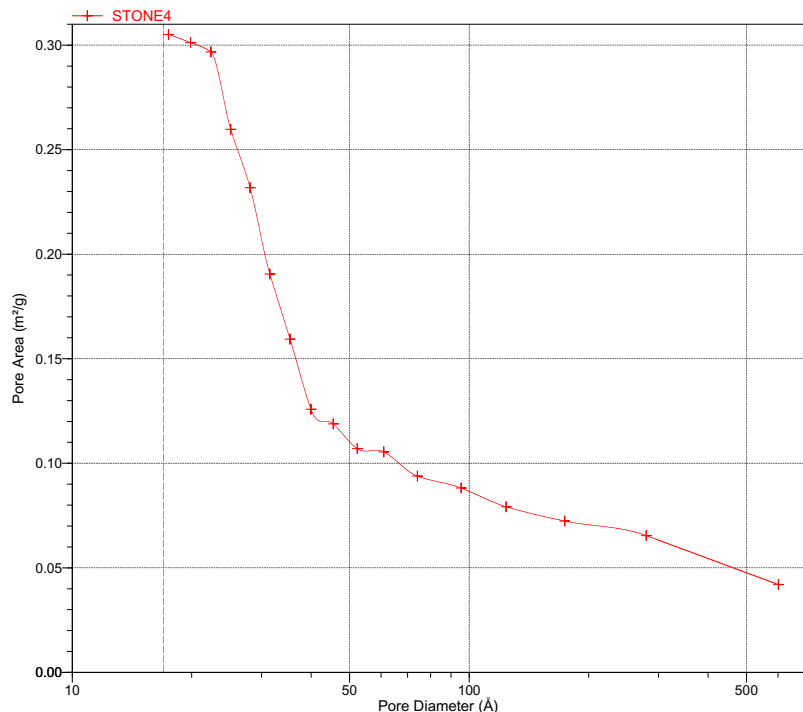


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Sample: STONE4
 Operator:
 Submitter:
 File: D:\DATA\2020\EVA\STONE4.SMP

Started: 2010-08-18 15:10:05 Analysis Adsorptive: N2
 Completed: 2010-08-18 20:57:59 Analysis Bath Temp.: -195.755 °C
 Report Time: 2010-08-30 13:51:55 Thermal Correction: No
 Sample Mass: 11.8628 g Smoothed Pressures: No
 Warm Free Space: 23.4907 cm³ Measured Cold Free Space: 68.4359 cm³
 Equilibration Interval: 10 s Low Pressure Dose: None
 Automatic Degas: Yes

BJH Adsorption dA/dlog(D) Pore Area



Horvath-Kawazoe Report

Slit Pore Geometry (Original H-K)

Maximum Pore Volume: 0.000662 cm³/g
 at Relative Pressure: 0.985310403
 Median Pore Width: 514.535 Å
 Relative Pressure Range: 1.197e-02 to 9.853e-01

Diameter of Adsorptive Molecule: 3.000 Å
 Diameter of Adsorptive at Zero Interaction Energy: 2.574 Å
 Diameter of Sample Atom: 3.040 Å
 Diameter of Sample Atom at Zero Interaction Energy: 2.609 Å
 Interaction Parameter: 3.49e-43 erg·cm⁴

Density Conversion Factor: 0.0015468

Absolute Pressure (mmHg)	Relative Pressure (p/p [*])	Quantity Adsorbed (cm ³ /g STP)	Pore Width (Å)	Cumulative Pore Volume (cm ³ /g)	Differential Pore Volume (cm ³ /g·Å)
9.14410	0.011974025	0.0277	10.537	0.0000	0.0000
23.23256	0.030423055	0.0329	12.662	0.0001	0.0000
30.70734	0.040211879	0.0348	13.526	0.0001	0.0000
37.79764	0.049497503	0.0364	14.281	0.0001	0.0000
45.77684	0.059947481	0.0379	15.061	0.0001	0.0000
58.07185	0.076049645	0.0396	16.201	0.0001	0.0000
70.62080	0.092483481	0.0416	17.313	0.0001	0.0000
83.19170	0.108946063	0.0436	18.386	0.0001	0.0000
120.79569	0.158191450	0.0489	21.535	0.0001	0.0000
158.63382	0.207743451	0.0537	24.755	0.0001	0.0000
196.10434	0.256814041	0.0584	28.173	0.0001	0.0000
233.82837	0.306216622	0.0631	31.919	0.0001	0.0000
271.49020	0.355537753	0.0677	36.114	0.0001	0.0000
309.18625	0.404903686	0.0723	40.852	0.0001	0.0000
346.83905	0.454212988	0.0769	46.382	0.0001	0.0000
384.49011	0.503520012	0.0815	52.906	0.0001	0.0000
422.12393	0.552804456	0.0861	60.738	0.0001	0.0000
459.77280	0.602108602	0.0913	70.433	0.0001	0.0000
497.48306	0.651493159	0.0972	82.923	0.0002	0.0000
535.10162	0.700757620	0.1045	99.256	0.0002	0.0000
585.25525	0.766437733	0.1168	131.990	0.0002	0.0000
622.84747	0.815667704	0.1303	171.149	0.0002	0.0000
660.39355	0.864837248	0.1502	239.083	0.0002	0.0000
697.64423	0.913619929	0.1858	384.357	0.0003	0.0000
733.33044	0.960353836	0.2727	849.233	0.0004	0.0000
752.38739	0.985310403	0.4280	2212.870	0.0007	0.0000

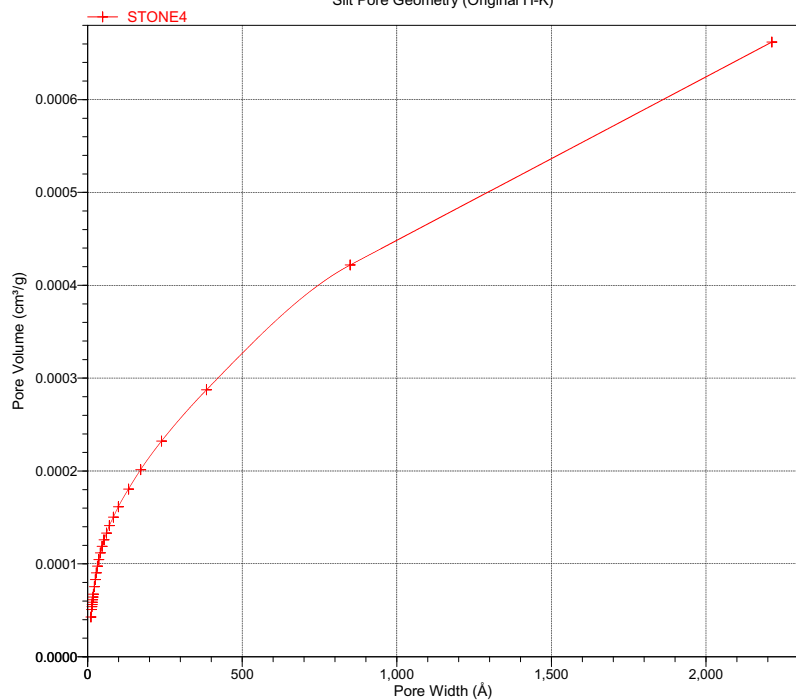


Sample: STONE4
 Operator:
 Submitter:
 File: D:\DATA\2020\EVA\STONE4.SMP

Started: 2010-08-18 15:10:05	Analysis Adsorptive: N2
Completed: 2010-08-18 20:57:59	Analysis Bath Temp.: -195.755 °C
Report Time: 2010-08-30 13:51:55	Thermal Correction: No
Sample Mass: 11.8628 g	Smoothed Pressures: No
Warm Free Space: 23.4907 cm ³ Measured	Cold Free Space: 68.4359 cm ³
Equilibration Interval: 10 s	Low Pressure Dose: None
Automatic Degas: Yes	

Horvath-Kawazoe Cumulative Pore Volume Plot

Slit Pore Geometry (Original H-K)

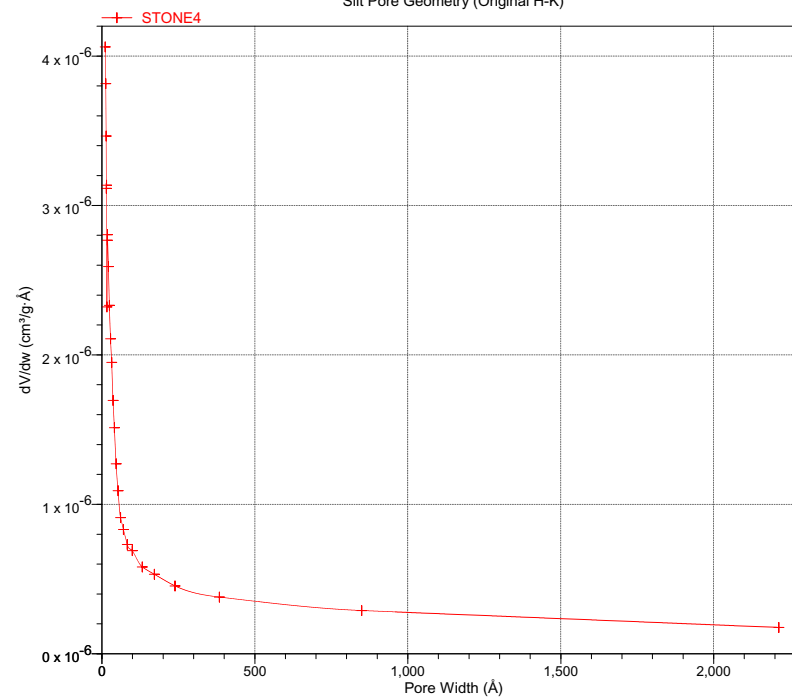


Sample: STONE4
 Operator:
 Submitter:
 File: D:\DATA\2020\EVA\STONE4.SMP

Started: 2010-08-18 15:10:05	Analysis Adsorptive: N2
Completed: 2010-08-18 20:57:59	Analysis Bath Temp.: -195.755 °C
Report Time: 2010-08-30 13:51:55	Thermal Correction: No
Sample Mass: 11.8628 g	Smoothed Pressures: No
Warm Free Space: 23.4907 cm ³ Measured	Cold Free Space: 68.4359 cm ³
Equilibration Interval: 10 s	Low Pressure Dose: None
Automatic Degas: Yes	

Horvath-Kawazoe Differential Pore Volume Plot

Slit Pore Geometry (Original H-K)





ASAP 2020 V1.05 H

Unit 1

Serial #: 182

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Sample: STONE4
 Operator:
 Submitter:
 File: D:\DATA\2020\EVA\STONE4.SMP

Started: 2010-08-18 15:10:05 Analysis Adsorptive: N2
 Completed: 2010-08-18 20:57:59 Analysis Bath Temp.: -195.755 °C
 Report Time: 2010-08-30 13:51:55 Thermal Correction: No
 Sample Mass: 11.8628 g Smoothed Pressures: No
 Warm Free Space: 23.4907 cm³ Measured Cold Free Space: 68.4359 cm³
 Equilibration Interval: 10 s Low Pressure Dose: None
 Automatic Degas: Yes

Summary Report

Surface Area

Single point surface area at $p/p^* = 0.306216622$: 0.1905 m²/g

BET Surface Area: 0.1979 m²/g

t-Plot External Surface Area: 0.2323 m²/g

BJH Adsorption cumulative surface area of pores
 between 17.000 Å and 3000.000 Å diameter: 0.2022 m²/g

BJH Desorption cumulative surface area of pores
 between 17.000 Å and 3000.000 Å diameter: 0.2896 m²/g

Pore Volume

Single point adsorption total pore volume of pores
 less than 1337.1795 Å at $p/p^* = 0.985310403$: 0.000662 cm³/g

t-Plot micropore volume: -0.000020 cm³/g

BJH Adsorption cumulative volume of pores
 between 17.000 Å and 3000.000 Å diameter: 0.000644 cm³/g

BJH Desorption cumulative volume of pores
 between 17.000 Å and 3000.000 Å diameter: 0.000366 cm³/g

Pore Size

Adsorption average pore width (4V/A by BET): 133.7969 Å

BJH Adsorption average pore diameter (4V/A): 127.409 Å

BJH Desorption average pore diameter (4V/A): 50.527 Å

Horvath-Kawazoe

Maximum pore volume at $p/p^* = 0.985310403$: 0.000662 cm³/g

Median pore width: 514.5350 Å

Dubinin-Radushkevich

Micropore surface area: 0.0000 m²/g

Monolayer capacity: 0.000000 cm³/g

Dubinin-Astakhov

Micropore surface area: 0.1859 m²/g

Limiting micropore volume: 0.000100 cm³/g



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Unit 1

Serial #: 182

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Sample: STONE4
 Operator:
 Submitter:
 File: D:\DATA\2020\EVA\STONE4.SMP

Started: 2010-08-18 15:10:05 Analysis Adsorptive: N2
 Completed: 2010-08-18 20:57:59 Analysis Bath Temp.: -195.755 °C
 Report Time: 2010-08-30 13:51:55 Thermal Correction: No
 Sample Mass: 11.8628 g Smoothed Pressures: No
 Warm Free Space: 23.4907 cm³ Measured Cold Free Space: 68.4359 cm³
 Equilibration Interval: 10 s Low Pressure Dose: None
 Automatic Degas: Yes

Dubinin-Astakhov

MP-Method

Cumulative surface area of pores between
 18.6026 Å and 18.6026 Å hydraulic radius: 0.0000 m²/g

Cumulative pore volume of pores between
 18.6026 Å and 18.6026 Å hydraulic radius: 0.000000 cm³/g

Average pore hydraulic radius (V/A): 0.0000 Å

A2.8 N₂ adsorption isotherms (as referenced to in Section 3.2.1) for the M sample size fraction 0.5–1 mm (duplicate)



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Sample: AG0.5-1
 Operator:
 Submitter:
 File: D:\DATA\2020\EVA\AG0.5-1

Sample: AG0.5-1
 Operator:
 Submitter:
 File: D:\DATA\2020\EVA\AG0.5-1

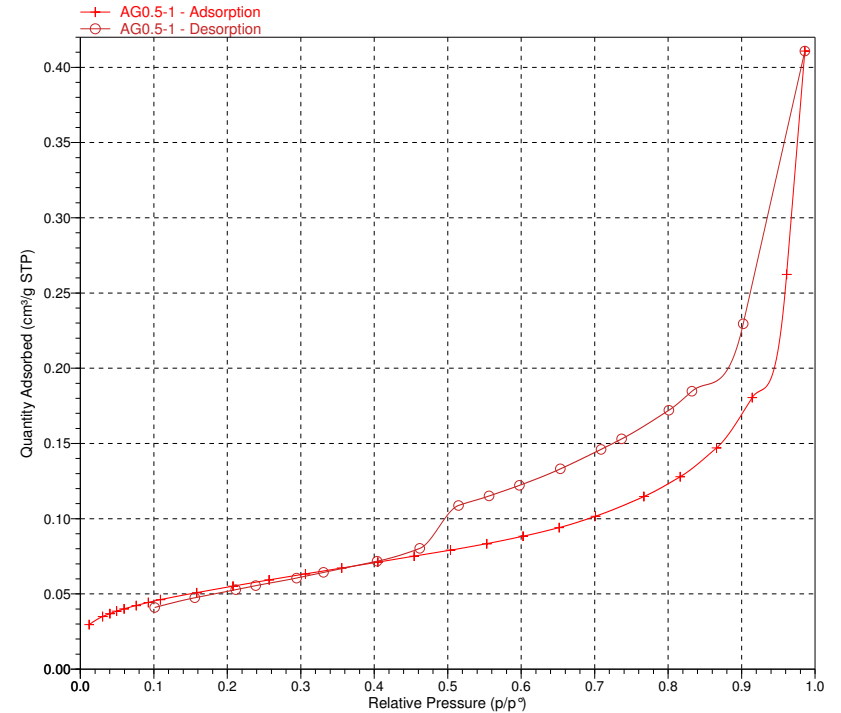
Started: 2010-10-27 16:44:56 Analysis Adsorptive: N2
 Completed: 2010-10-27 22:42:00 Analysis Bath Temp.: -195.730 °C
 Report Time: 2010-11-05 10:51:55 Thermal Correction: No
 Sample Mass: 12.4026 g Smoothed Pressures: No
 Warm Free Space: 22.9376 cm³ Measured Cold Free Space: 67.4384 cm³
 Equilibration Interval: 10 s Low Pressure Dose: None
 Automatic Degas: Yes

Started: 2010-10-27 16:44:56 Analysis Adsorptive: N2
 Completed: 2010-10-27 22:42:00 Analysis Bath Temp.: -195.730 °C
 Report Time: 2010-11-05 10:51:55 Thermal Correction: No
 Sample Mass: 12.4026 g Smoothed Pressures: No
 Warm Free Space: 22.9376 cm³ Measured Cold Free Space: 67.4384 cm³
 Equilibration Interval: 10 s Low Pressure Dose: None
 Automatic Degas: Yes

Isotherm Tabular Report

Relative Pressure (p/p ^o)	Absolute Pressure (mmHg)	Quantity Adsorbed (cm ³ /g STP)	Elapsed Time (h:min)	Saturation Pressure (mmHg)
			03:36	766.75122
0.011935530	9.15118	0.0296	03:39	
0.030271051	23.20834	0.0350	03:42	
0.040285258	30.88472	0.0369	03:45	
0.049397316	37.86884	0.0385	03:48	
0.059670285	45.74294	0.0401	03:50	
0.076080164	58.32012	0.0423	03:53	
0.092518535	70.91805	0.0444	03:56	
0.108967137	83.52393	0.0462	03:58	
0.158357882	121.37691	0.0509	04:01	
0.207855135	159.30589	0.0552	04:05	
0.257045524	197.00102	0.0593	04:07	
0.306452934	234.86028	0.0633	04:09	
0.355809329	272.67426	0.0672	04:12	
0.405069496	310.41571	0.0711	04:14	
0.454493075	348.27512	0.0751	04:17	
0.503921014	386.13455	0.0791	04:20	
0.553145409	423.83472	0.0834	04:23	
0.602638043	461.74384	0.0884	04:25	
0.651885634	499.45572	0.0941	04:28	
0.701184275	537.21124	0.1016	04:30	
0.766970197	587.58734	0.1147	04:33	
0.816600190	625.58228	0.1279	04:36	
0.865769032	663.23029	0.1470	04:38	
0.914459095	700.50934	0.1805	04:40	
0.961290842	736.35199	0.2623	04:43	
0.986239149	755.39642	0.4109	04:49	
0.902094236	690.92664	0.2295	04:51	
0.832386649	637.49945	0.1847	04:55	
0.801096456	613.50842	0.1721	04:58	
0.736610404	564.09802	0.1530	05:01	
0.708667168	542.67529	0.1461	05:04	
0.653354300	500.28925	0.1331	05:08	
0.597588139	457.57440	0.1222	05:10	
0.556438958	426.04776	0.1151	05:13	
0.514875947	394.20703	0.1088	05:16	
0.462019851	353.72308	0.0803	05:19	
0.404018003	309.30325	0.0717	05:22	
0.330910025	253.32304	0.0643	05:25	
0.294330605	225.31038	0.0606	05:28	
0.238763850	182.76598	0.0555	05:31	
0.211433353	161.83829	0.0528	05:34	
0.155732496	119.19948	0.0475	05:36	
			05:39	765.37823
0.101172606	77.43531	0.0410	05:42	

Isotherm Linear Plot





ASAP 2020 V1.05 H Unit 1 Serial #: 182 Page 3

Sample: AG0.5-1
 Operator:
 Submitter:
 File: D:\DATA\2020\EVA\AG0.5-1

Started: 2010-10-27 16:44:56 Analysis Adsorptive: N2
 Completed: 2010-10-27 22:42:00 Analysis Bath Temp.: -195.730 °C
 Report Time: 2010-11-05 10:51:55 Thermal Correction: No
 Sample Mass: 12.4026 g Smoothed Pressures: No
 Warm Free Space: 22.9376 cm³ Measured Cold Free Space: 67.4384 cm³
 Equilibration Interval: 10 s Low Pressure Dose: None
 Automatic Degas: Yes

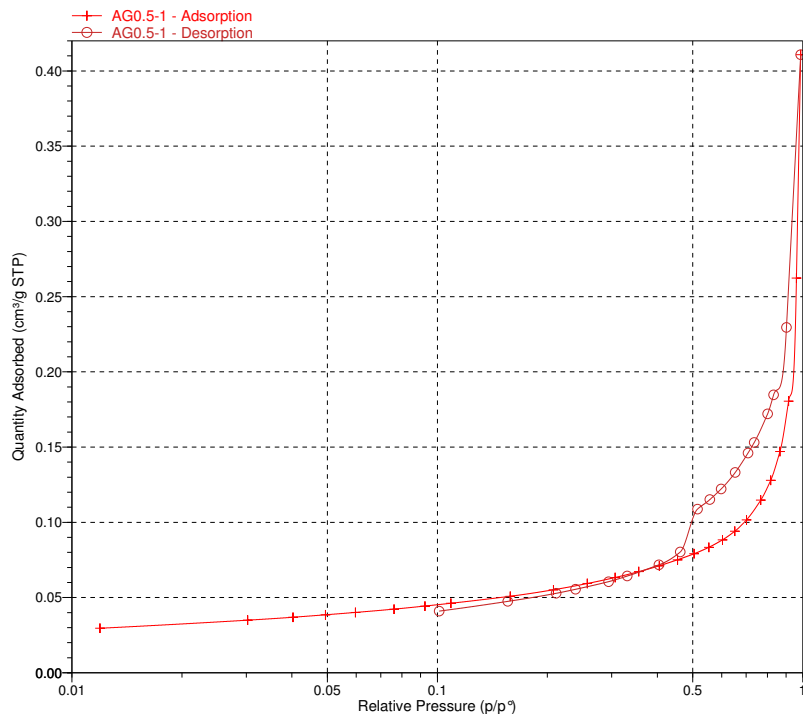


ASAP 2020 V1.05 H Unit 1 Serial #: 182 Page 4

Sample: AG0.5-1
 Operator:
 Submitter:
 File: D:\DATA\2020\EVA\AG0.5-1

Started: 2010-10-27 16:44:56 Analysis Adsorptive: N2
 Completed: 2010-10-27 22:42:00 Analysis Bath Temp.: -195.730 °C
 Report Time: 2010-11-05 10:51:55 Thermal Correction: No
 Sample Mass: 12.4026 g Smoothed Pressures: No
 Warm Free Space: 22.9376 cm³ Measured Cold Free Space: 67.4384 cm³
 Equilibration Interval: 10 s Low Pressure Dose: None
 Automatic Degas: Yes

Isotherm Log Plot



BET Surface Area Report

BET Surface Area: 0.1949 ± 0.0019 m²/g
 Slope: 22.109460 ± 0.217455 g/cm³ STP
 Y-Intercept: 0.230832 ± 0.044955 g/cm³ STP
 C: 96.781610
 Qm: 0.0448 cm³/g STP
 Correlation Coefficient: 0.9996616
 Molecular Cross-Sectional Area: 0.1620 nm²

Relative Pressure (p/p°)	Quantity Adsorbed (cm ³ /g STP)	1/[Q(p°p - 1)]
0.059670285	0.0401	1.582060
0.076080164	0.0423	1.946350
0.092518535	0.0444	2.298468
0.108967137	0.0462	2.646800
0.158357882	0.0509	3.699795
0.207855135	0.0552	4.756084
0.257045524	0.0593	5.832021
0.306452934	0.0633	6.977225
0.355809329	0.0672	8.216965



Sample: AG0.5-1
Operator:
Submitter:
File: D:\DATA\2020\EVA\AG0.5-1

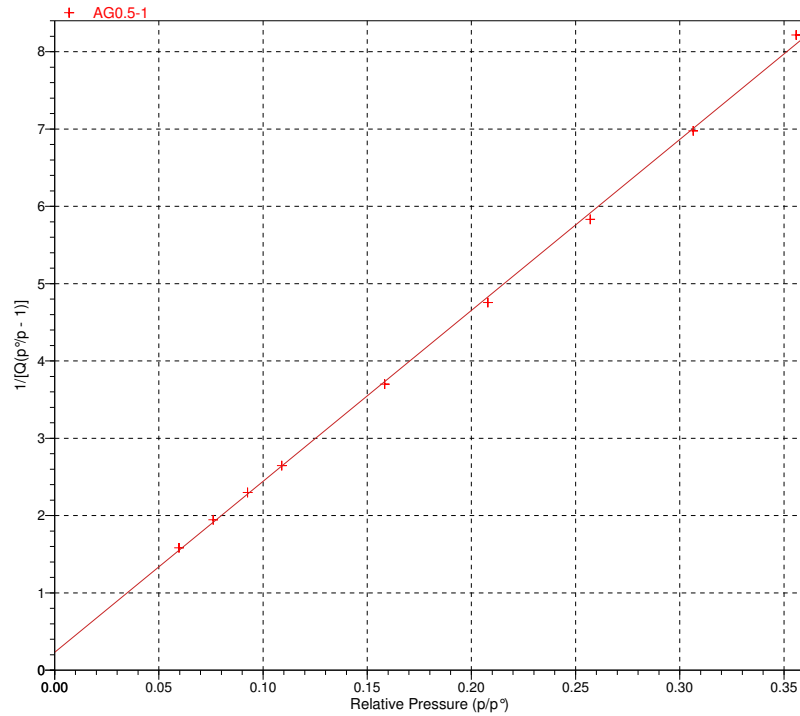
Started: 2010-10-27 16:44:56 Analysis Adsorptive: N2
Completed: 2010-10-27 22:42:00 Analysis Bath Temp.: -195.730 °C
Report Time: 2010-11-05 10:51:55 Thermal Correction: No
Sample Mass: 12.4026 g Smoothed Pressures: No
Warm Free Space: 22.9376 cm³ Measured Cold Free Space: 67.4384 cm³
Equilibration Interval: 10 s Low Pressure Dose: None
Automatic Degas: Yes



Sample: AG0.5-1
Operator:
Submitter:
File: D:\DATA\2020\EVA\AG0.5-1

Started: 2010-10-27 16:44:56 Analysis Adsorptive: N2
Completed: 2010-10-27 22:42:00 Analysis Bath Temp.: -195.730 °C
Report Time: 2010-11-05 10:51:55 Thermal Correction: No
Sample Mass: 12.4026 g Smoothed Pressures: No
Warm Free Space: 22.9376 cm³ Measured Cold Free Space: 67.4384 cm³
Equilibration Interval: 10 s Low Pressure Dose: None
Automatic Degas: Yes

BET Surface Area Plot



Langmuir Reports

Primary Data
4052- Fewer than two points are selected for this report.



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Sample: AG0.5-1
 Operator:
 Submitter:
 File: D:\DATA\2020\EVA\AG0.5-1

Started: 2010-10-27 16:44:56 Analysis Adsorptive: N2
 Completed: 2010-10-27 22:42:00 Analysis Bath Temp.: -195.730 °C
 Report Time: 2010-11-05 10:51:55 Thermal Correction: No
 Sample Mass: 12.4026 g Smoothed Pressures: No
 Warm Free Space: 22.9376 cm³ Measured Cold Free Space: 67.4384 cm³
 Equilibration Interval: 10 s Low Pressure Dose: None
 Automatic Degas: Yes

t-Plot Report

Micropore Volume: -0.000006 cm³/g STP
 Micropore Area: *
 External Surface Area: 0.2070 m²/g
 Slope: 0.013379 ± 0.000081 cm³/g·Å STP
 Y-Intercept: -0.003983 ± 0.000338 cm³/g STP
 Correlation Coefficient: 0.999944
 Surface Area Correction Factor: 1.000
 Density Conversion Factor: 0.0015468
 Total Surface Area (BET): 0.1949 m²/g
 Thickness Range: 3.5000 Å to 5.0000 Å
 Thickness Equation: Harkins and Jura
 $t = [13.99 / (0.034 - \log(p/p^*))] ^ 0.5$

Relative Pressure (p/p*)	Statistical Thickness (Å)	Quantity Adsorbed (cm ³ /g STP)
0.011935530	2.6736	0.0296
0.030271051	3.0014	0.0350
0.040285258	3.1291	0.0369
0.049397316	3.2308	0.0385
0.059670285	3.3345	0.0401
0.076080164	3.4837	0.0423
0.092518535	3.6197	0.0444
0.108967137	3.7465	0.0462
0.158357882	4.0948	0.0509
0.207855135	4.4196	0.0552
0.257045524	4.7350	0.0593
0.306452934	5.0543	0.0633
0.355809329	5.3831	0.0672
0.405069496	5.7275	0.0711
0.454493075	6.0960	0.0751
0.503921014	6.4950	0.0791
0.553145409	6.9317	0.0834
0.602638043	7.4223	0.0884
0.651885634	7.9775	0.0941
0.701184275	8.6226	0.1016
0.766970197	9.6826	0.1147
0.816600190	10.7089	0.1279
0.865769032	12.0344	0.1470
0.914459095	13.8592	0.1805
0.961290842	16.5389	0.2623
0.986239149	18.6975	0.4109



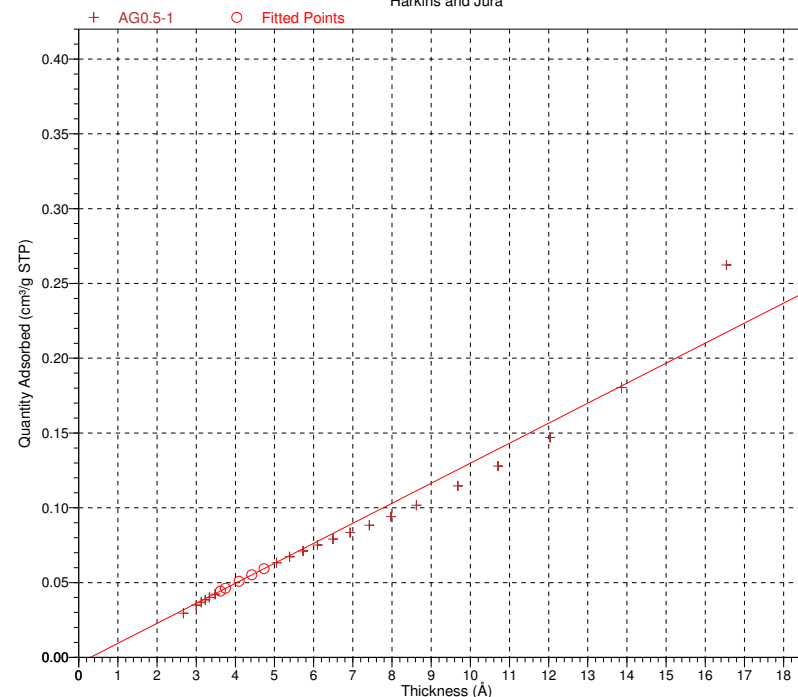
ASAP 2020 V1.05 H Unit 1 Serial #: 182 Page 8

Sample: AG0.5-1
 Operator:
 Submitter:
 File: D:\DATA\2020\EVA\AG0.5-1

Started: 2010-10-27 16:44:56 Analysis Adsorptive: N2
 Completed: 2010-10-27 22:42:00 Analysis Bath Temp.: -195.730 °C
 Report Time: 2010-11-05 10:51:55 Thermal Correction: No
 Sample Mass: 12.4026 g Smoothed Pressures: No
 Warm Free Space: 22.9376 cm³ Measured Cold Free Space: 67.4384 cm³
 Equilibration Interval: 10 s Low Pressure Dose: None
 Automatic Degas: Yes

t-Plot

Harkins and Jura



* The micropore area is not reported because either the micropore volume is negative or the calculated external surface area is larger than the total surface area.



ASAP 2020 V1.05 H

Unit 1

Serial #: 182

Page 9

Sample: AG0.5-1
 Operator:
 Submitter:
 File: D:\DATA\2020\EVA\AG0.5-1

Started: 2010-10-27 16:44:56 Analysis Adsorptive: N2
 Completed: 2010-10-27 22:42:00 Analysis Bath Temp.: -195.730 °C
 Report Time: 2010-11-05 10:51:55 Thermal Correction: No
 Sample Mass: 12.4026 g Smoothed Pressures: No
 Warm Free Space: 22.9376 cm³ Measured Cold Free Space: 67.4384 cm³
 Equilibration Interval: 10 s Low Pressure Dose: None
 Automatic Degas: Yes

Alpha-S Method

Primary Data

At least two fitted data points are needed for alpha-S calculations.



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Unit 1

Serial #: 182

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Sample: AG0.5-1
 Operator:
 Submitter:
 File: D:\DATA\2020\EVA\AG0.5-1

Started: 2010-10-27 16:44:56 Analysis Adsorptive: N2
 Completed: 2010-10-27 22:42:00 Analysis Bath Temp.: -195.730 °C
 Report Time: 2010-11-05 10:51:55 Thermal Correction: No
 Sample Mass: 12.4026 g Smoothed Pressures: No
 Warm Free Space: 22.9376 cm³ Measured Cold Free Space: 67.4384 cm³
 Equilibration Interval: 10 s Low Pressure Dose: None
 Automatic Degas: Yes

BJH Adsorption Pore Distribution Report

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

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)
1422.5 - 514.9	615.1	0.000256	0.000256	0.017	0.017
514.9 - 236.8	282.5	0.000143	0.000399	0.020	0.037
236.8 - 151.9	175.6	0.000057	0.000455	0.013	0.050
151.9 - 111.3	125.0	0.000032	0.000487	0.010	0.060
111.3 - 87.3	96.2	0.000022	0.000509	0.009	0.069
87.3 - 67.4	74.6	0.000022	0.000531	0.012	0.081
67.4 - 57.2	61.4	0.000012	0.000544	0.008	0.089
57.2 - 49.4	52.7	0.000009	0.000553	0.007	0.096
49.4 - 43.2	45.9	0.000007	0.000560	0.006	0.102
43.2 - 38.2	40.3	0.000006	0.000566	0.006	0.109
38.2 - 33.9	35.7	0.000006	0.000572	0.006	0.115
33.9 - 30.2	31.8	0.000006	0.000579	0.008	0.123
30.2 - 27.0	28.4	0.000006	0.000585	0.009	0.132
27.0 - 24.2	25.4	0.000006	0.000591	0.010	0.142
24.2 - 21.6	22.7	0.000007	0.000598	0.012	0.153
21.6 - 19.2	20.2	0.000007	0.000605	0.014	0.167
19.2 - 16.8	17.8	0.000007	0.000612	0.015	0.183

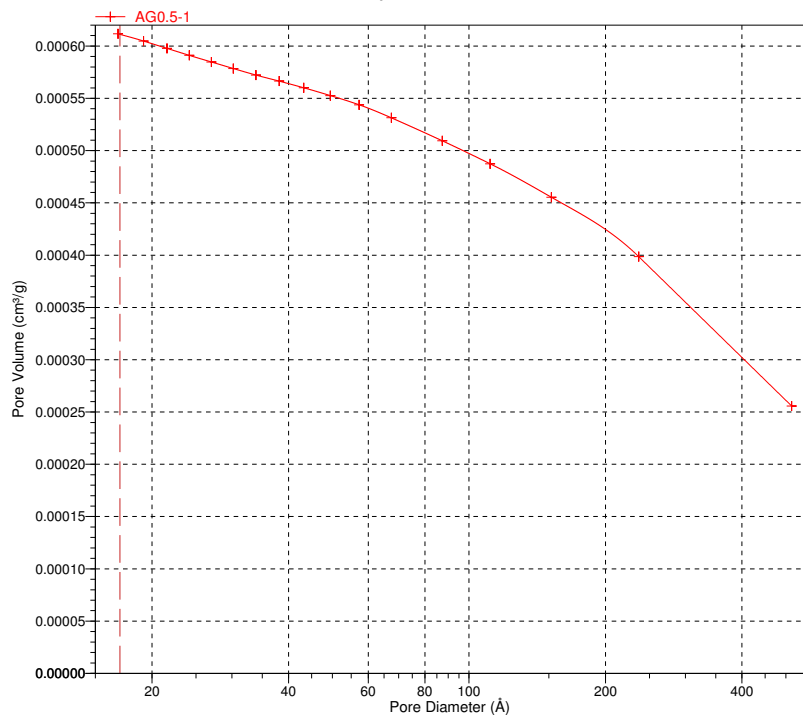


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Sample: AG0.5-1
 Operator:
 Submitter:
 File: D:\DATA\2020\EVA\AG0.5-1

Started: 2010-10-27 16:44:56 Analysis Adsorptive: N2
 Completed: 2010-10-27 22:42:00 Analysis Bath Temp.: -195.730 °C
 Report Time: 2010-11-05 10:51:55 Thermal Correction: No
 Sample Mass: 12.4026 g Smoothed Pressures: No
 Warm Free Space: 22.9376 cm³ Measured Cold Free Space: 67.4384 cm³
 Equilibration Interval: 10 s Low Pressure Dose: None
 Automatic Degas: Yes

BJH Adsorption Cumulative Pore Volume

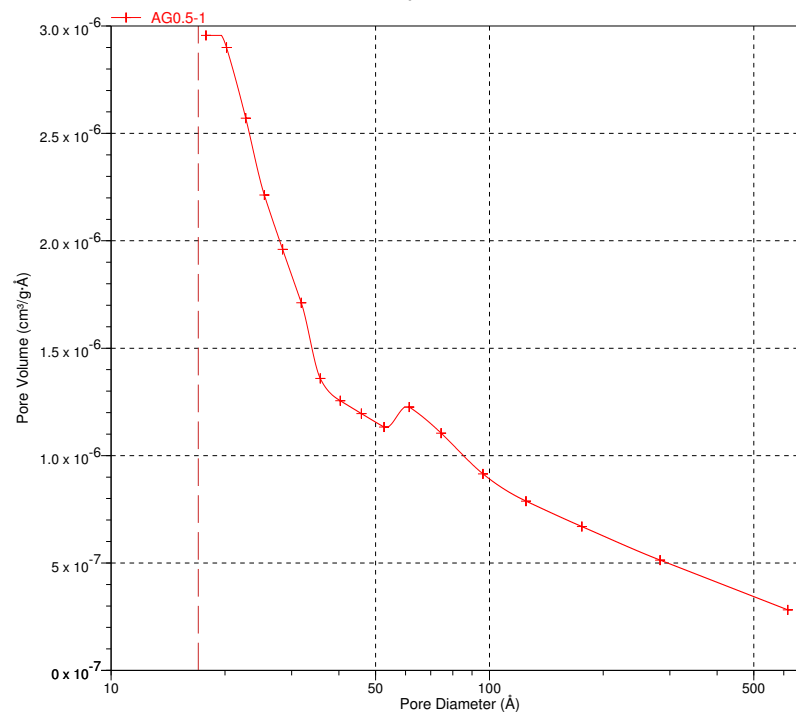


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Sample: AG0.5-1
 Operator:
 Submitter:
 File: D:\DATA\2020\EVA\AG0.5-1

Started: 2010-10-27 16:44:56 Analysis Adsorptive: N2
 Completed: 2010-10-27 22:42:00 Analysis Bath Temp.: -195.730 °C
 Report Time: 2010-11-05 10:51:55 Thermal Correction: No
 Sample Mass: 12.4026 g Smoothed Pressures: No
 Warm Free Space: 22.9376 cm³ Measured Cold Free Space: 67.4384 cm³
 Equilibration Interval: 10 s Low Pressure Dose: None
 Automatic Degas: Yes

BJH Adsorption dV/dD Pore Volume



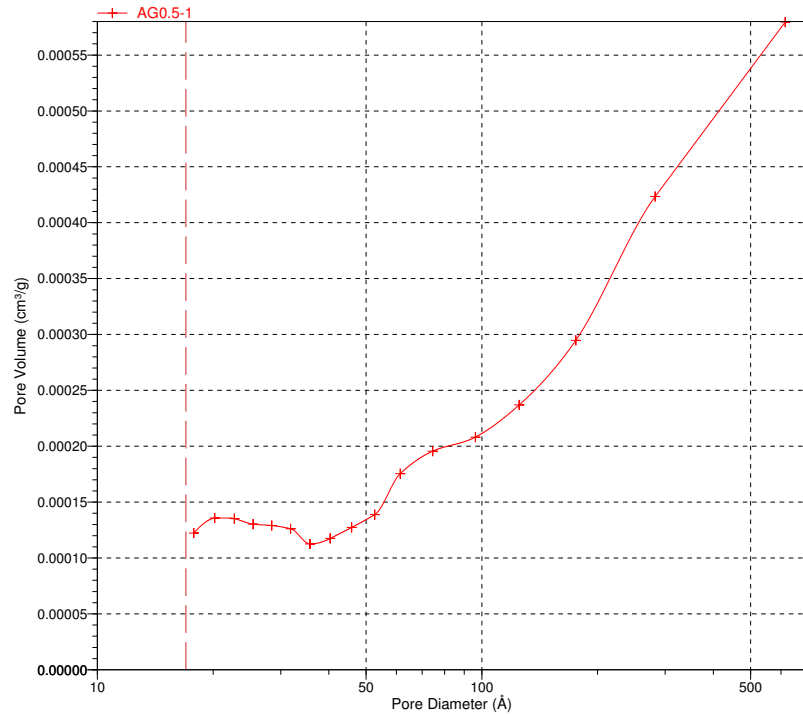


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Sample: AG0.5-1
Operator:
Submitter:
File: D:\DATA\2020\EVA\AG0.5-1

Started: 2010-10-27 16:44:56 Analysis Adsorptive: N2
Completed: 2010-10-27 22:42:00 Analysis Bath Temp.: -195.730 °C
Report Time: 2010-11-05 10:51:55 Thermal Correction: No
Sample Mass: 12.4026 g Smoothed Pressures: No
Warm Free Space: 22.9376 cm³ Measured Cold Free Space: 67.4384 cm³
Equilibration Interval: 10 s Low Pressure Dose: None
Automatic Degas: Yes

BJH Adsorption dV/dlog(D) Pore Volume

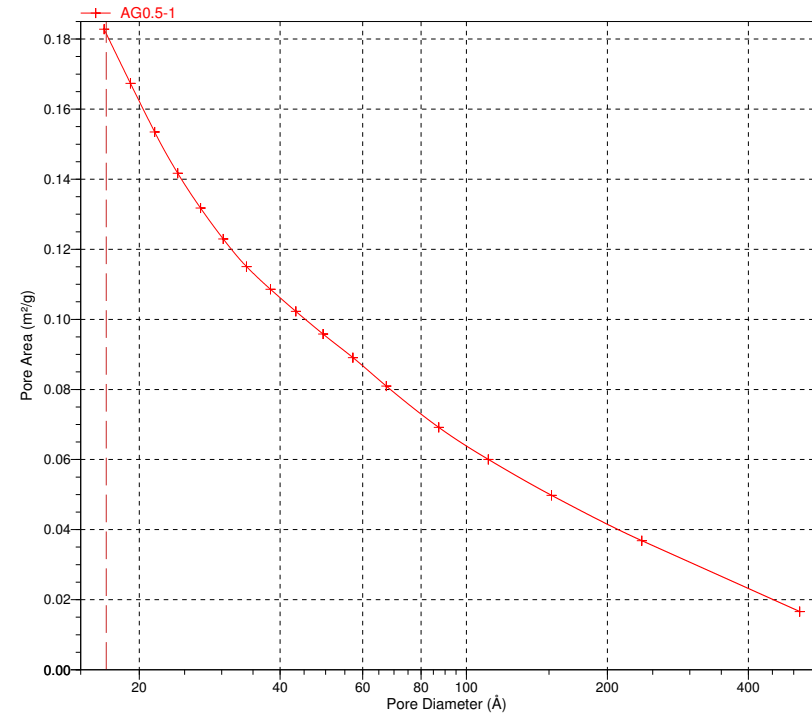


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Sample: AG0.5-1
Operator:
Submitter:
File: D:\DATA\2020\EVA\AG0.5-1

Started: 2010-10-27 16:44:56 Analysis Adsorptive: N2
Completed: 2010-10-27 22:42:00 Analysis Bath Temp.: -195.730 °C
Report Time: 2010-11-05 10:51:55 Thermal Correction: No
Sample Mass: 12.4026 g Smoothed Pressures: No
Warm Free Space: 22.9376 cm³ Measured Cold Free Space: 67.4384 cm³
Equilibration Interval: 10 s Low Pressure Dose: None
Automatic Degas: Yes

BJH Adsorption Cumulative Pore Area





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Sample: AG0.5-1
 Operator:
 Submitter:
 File: D:\DATA\2020\EVA\AG0.5-1

Started: 2010-10-27 16:44:56 Analysis Adsorptive: N2
 Completed: 2010-10-27 22:42:00 Analysis Bath Temp.: -195.730 °C
 Report Time: 2010-11-05 10:51:55 Thermal Correction: No
 Sample Mass: 12.4026 g Smoothed Pressures: No
 Warm Free Space: 22.9376 cm³ Measured Cold Free Space: 67.4384 cm³
 Equilibration Interval: 10 s Low Pressure Dose: None
 Automatic Degas: Yes

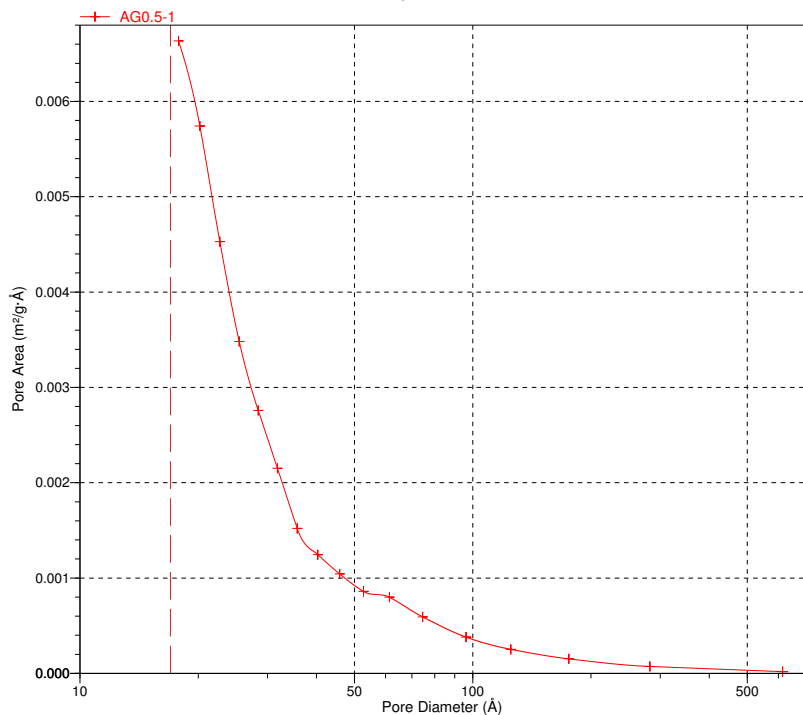


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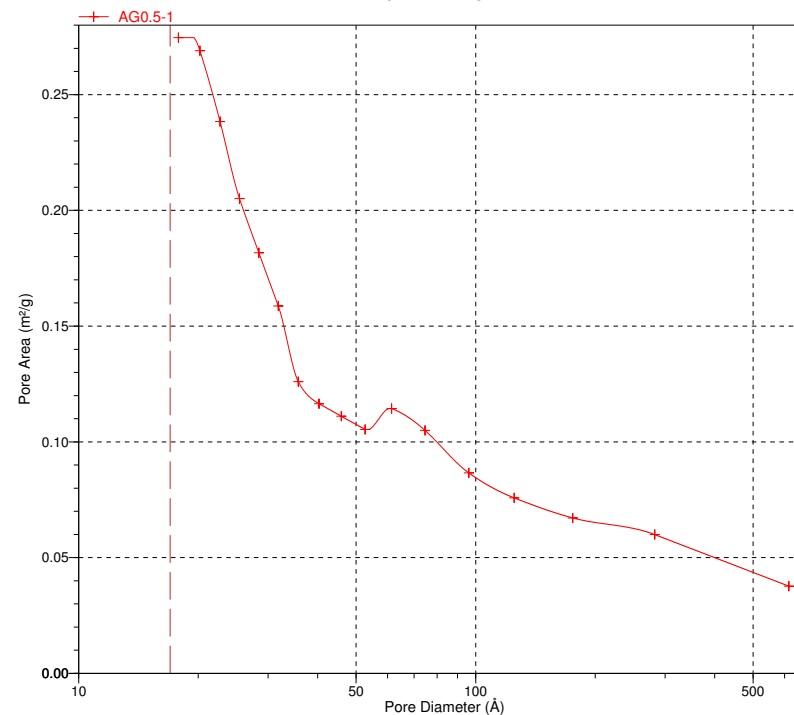
Sample: AG0.5-1
 Operator:
 Submitter:
 File: D:\DATA\2020\EVA\AG0.5-1

Started: 2010-10-27 16:44:56 Analysis Adsorptive: N2
 Completed: 2010-10-27 22:42:00 Analysis Bath Temp.: -195.730 °C
 Report Time: 2010-11-05 10:51:55 Thermal Correction: No
 Sample Mass: 12.4026 g Smoothed Pressures: No
 Warm Free Space: 22.9376 cm³ Measured Cold Free Space: 67.4384 cm³
 Equilibration Interval: 10 s Low Pressure Dose: None
 Automatic Degas: Yes

BJH Adsorption dA/dD Pore Area



BJH Adsorption dA/dlog(D) Pore Area





Sample: AG0.5-1
 Operator:
 Submitter:
 File: D:\DATA\2020\EVA\AG0.5-1

Started: 2010-10-27 16:44:56 Analysis Adsorptive: N2
 Completed: 2010-10-27 22:42:00 Analysis Bath Temp.: -195.730 °C
 Report Time: 2010-11-05 10:51:55 Thermal Correction: No
 Sample Mass: 12.4026 g Smoothed Pressures: No
 Warm Free Space: 22.9376 cm³ Measured Cold Free Space: 67.4384 cm³
 Equilibration Interval: 10 s Low Pressure Dose: None
 Automatic Degas: Yes

Horvath-Kawazoe Report

Slit Pore Geometry (Original H-K)

Maximum Pore Volume: 0.000636 cm³/g
 at Relative Pressure: 0.986239149
 Median Pore Width: 510.567 Å
 Relative Pressure Range: 1.194e-02 to 9.862e-01

Diameter of Adsorptive Molecule: 3.000 Å
 Diameter of Adsorptive at Zero Interaction Energy: 2.574 Å
 Diameter of Sample Atom: 3.040 Å
 Diameter of Sample Atom at Zero Interaction Energy: 2.609 Å
 Interaction Parameter: 3.49e-43 erg·cm⁴

Density Conversion Factor: 0.0015468

Absolute Pressure (mmHg)	Relative Pressure (p/p*)	Quantity Adsorbed (cm ³ /g STP)	Pore Width (Å)	Cumulative Pore Volume (cm ³ /g)	Differential Pore Volume (cm ³ /g·Å)
9.15118	0.011935530	0.0296	10.528	0.0000	0.0000
23.20834	0.030271051	0.0350	12.645	0.0001	0.0000
30.88472	0.040285258	0.0369	13.533	0.0001	0.0000
37.86884	0.049397316	0.0385	14.268	0.0001	0.0000
45.74294	0.059670285	0.0401	15.044	0.0001	0.0000
58.32012	0.076080164	0.0423	16.201	0.0001	0.0000
70.91805	0.092518535	0.0444	17.310	0.0001	0.0000
83.52393	0.108967137	0.0462	18.382	0.0001	0.0000
121.37691	0.158357882	0.0509	21.531	0.0001	0.0000
159.30589	0.207855135	0.0552	24.750	0.0001	0.0000
197.00102	0.257045524	0.0593	28.168	0.0001	0.0000
234.86028	0.306452934	0.0633	31.944	0.0001	0.0000
272.67426	0.355809329	0.0672	36.142	0.0001	0.0000
310.41571	0.405069496	0.0711	40.883	0.0001	0.0000
348.27512	0.454493075	0.0751	46.418	0.0001	0.0000
386.13455	0.503921014	0.0791	52.946	0.0001	0.0000
423.83472	0.553145409	0.0834	60.784	0.0001	0.0000
461.74384	0.602638043	0.0884	70.549	0.0001	0.0000
499.45572	0.651885634	0.0941	83.059	0.0001	0.0000
537.21124	0.701184275	0.1016	99.418	0.0002	0.0000
587.58734	0.766970197	0.1147	132.205	0.0002	0.0000
625.58228	0.816600190	0.1279	172.778	0.0002	0.0000
663.23029	0.865769032	0.1470	241.348	0.0002	0.0000
700.50934	0.914459095	0.1805	387.980	0.0003	0.0000
736.35199	0.961290842	0.2623	857.204	0.0004	0.0000
755.39642	0.986239149	0.4109	2319.619	0.0006	0.0000

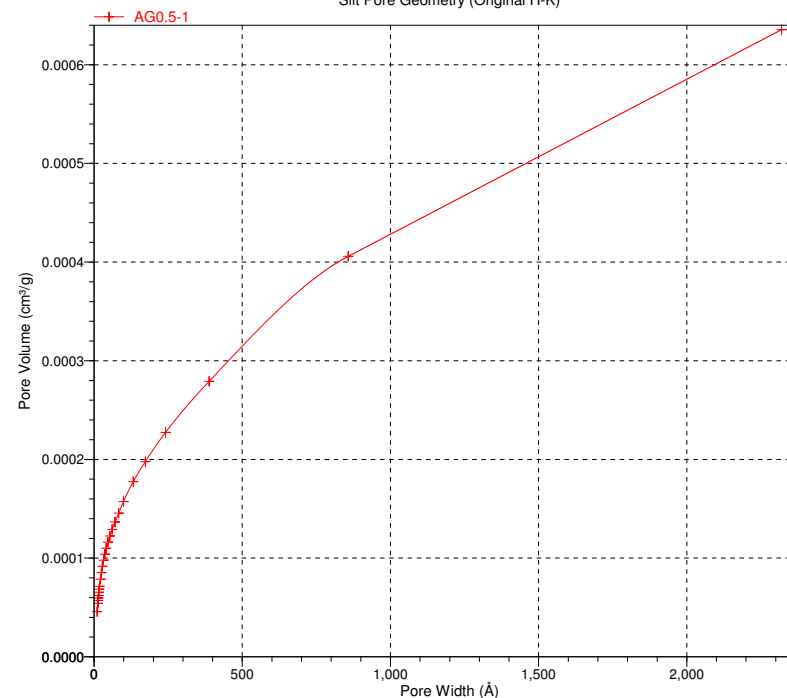


Sample: AG0.5-1
 Operator:
 Submitter:
 File: D:\DATA\2020\EVA\AG0.5-1

Started: 2010-10-27 16:44:56 Analysis Adsorptive: N2
 Completed: 2010-10-27 22:42:00 Analysis Bath Temp.: -195.730 °C
 Report Time: 2010-11-05 10:51:55 Thermal Correction: No
 Sample Mass: 12.4026 g Smoothed Pressures: No
 Warm Free Space: 22.9376 cm³ Measured Cold Free Space: 67.4384 cm³
 Equilibration Interval: 10 s Low Pressure Dose: None
 Automatic Degas: Yes

Horvath-Kawazoe Cumulative Pore Volume Plot

Slit Pore Geometry (Original H-K)





ASAP 2020 V1.05 H

Unit 1

Serial #: 182

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Sample: AG0.5-1
 Operator:
 Submitter:
 File: D:\DATA\2020\EVA\AG0.5-1

Started: 2010-10-27 16:44:56 Analysis Adsorptive: N2
 Completed: 2010-10-27 22:42:00 Analysis Bath Temp.: -195.730 °C
 Report Time: 2010-11-05 10:51:55 Thermal Correction: No
 Sample Mass: 12.4026 g Smoothed Pressures: No
 Warm Free Space: 22.9376 cm³ Measured Cold Free Space: 67.4384 cm³
 Equilibration Interval: 10 s Low Pressure Dose: None
 Automatic Degas: Yes



ASAP 2020 V1.05 H

Unit 1

Serial #: 182

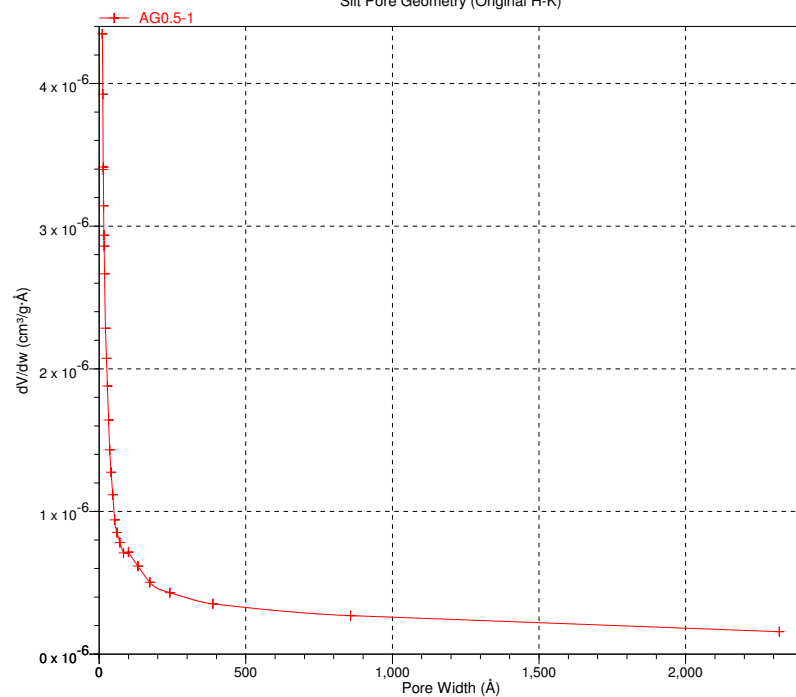
Page 20

Sample: AG0.5-1
 Operator:
 Submitter:
 File: D:\DATA\2020\EVA\AG0.5-1

Started: 2010-10-27 16:44:56 Analysis Adsorptive: N2
 Completed: 2010-10-27 22:42:00 Analysis Bath Temp.: -195.730 °C
 Report Time: 2010-11-05 10:51:55 Thermal Correction: No
 Sample Mass: 12.4026 g Smoothed Pressures: No
 Warm Free Space: 22.9376 cm³ Measured Cold Free Space: 67.4384 cm³
 Equilibration Interval: 10 s Low Pressure Dose: None
 Automatic Degas: Yes

Horvath-Kawazoe Differential Pore Volume Plot

Slit Pore Geometry (Original H-K)



Summary Report

Surface Area

Single point surface area at $p/p^0 = 0.306452934$: 0.1912 m²/gBET Surface Area: 0.1949 m²/gt-Plot External Surface Area: 0.2070 m²/gBJH Adsorption cumulative surface area of pores
between 17.000 Å and 3000.000 Å diameter: 0.1828 m²/gBJH Desorption cumulative surface area of pores
between 17.000 Å and 3000.000 Å diameter: 0.2713 m²/g

Pore Volume

Single point adsorption total pore volume of pores
less than 1425.8429 Å at $p/p^0 = 0.986239149$: 0.000636 cm³/gt-Plot micropore volume: -0.000006 cm³/gBJH Adsorption cumulative volume of pores
between 17.000 Å and 3000.000 Å diameter: 0.000612 cm³/gBJH Desorption cumulative volume of pores
between 17.000 Å and 3000.000 Å diameter: 0.000355 cm³/g

Pore Size

Adsorption average pore width (4V/A by BET): 130.4547 Å

BJH Adsorption average pore diameter (4V/A): 133.845 Å

BJH Desorption average pore diameter (4V/A): 52.315 Å

Horvath-Kawazoe

Maximum pore volume at $p/p^0 = 0.986239149$: 0.000636 cm³/g

Median pore width: 510.5666 Å

Dubinin-Radushkevich

Micropore surface area: 0.0000 m²/gMonolayer capacity: 0.000000 cm³/g

Dubinin-Astakhov

Micropore surface area: 0.1951 m²/gLimiting micropore volume: 0.000103 cm³/g



ASAP 2020 V1.05 H

Unit 1

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Sample: AG0.5-1

Operator:

Submitter:

File: D:\DATA\2020\EVA\AG0.5-1

Started: 2010-10-27 16:44:56	Analysis Adsorptive: N2
Completed: 2010-10-27 22:42:00	Analysis Bath Temp.: -195.730 °C
Report Time: 2010-11-05 10:51:55	Thermal Correction: No
Sample Mass: 12.4026 g	Smoothed Pressures: No
Warm Free Space: 22.9376 cm ³ Measured	Cold Free Space: 67.4384 cm ³
Equilibration Interval: 10 s	Low Pressure Dose: None
Automatic Degas: Yes	

Dubinin-Astakhov**MP-Method**

Cumulative surface area of pores between
18.6975 Å and 18.6975 Å hydraulic radius: 0.0000 m²/g

Cumulative pore volume of pores between
18.6975 Å and 18.6975 Å hydraulic radius: 0.000000 cm³/g

Average pore hydraulic radius (V/A): 0.0000 Å

A2.9 N₂ adsorption isotherms (as referenced to in Section 3.2.1) for the M sample size fraction 1–2 mm



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ASAP 2020 V1.05 H Unit 1 Serial #: 182 Page 2

Sample: STONE2
 Operator:
 Submitter:
 File: D:\DATA\2020\EVA\STONE2.SMP

Sample: STONE2
 Operator:
 Submitter:
 File: D:\DATA\2020\EVA\STONE2.SMP

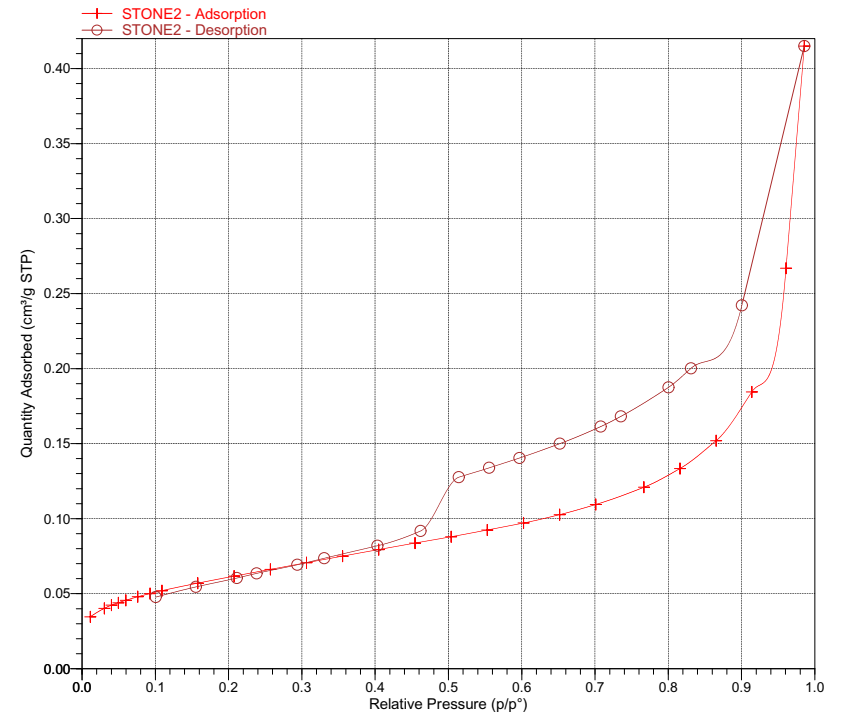
Started: 2010-07-01 9:54:31 Analysis Adsorptive: N2
 Completed: 2010-07-01 14:50:49 Analysis Bath Temp.: -195.658 °C
 Report Time: 2010-08-30 13:54:09 Thermal Correction: No
 Sample Mass: 12.5394 g Smoothed Pressures: No
 Warm Free Space: 23.3411 cm³ Measured Cold Free Space: 68.4296 cm³
 Equilibration Interval: 10 s Low Pressure Dose: None
 Automatic Degas: Yes

Started: 2010-07-01 9:54:31 Analysis Adsorptive: N2
 Completed: 2010-07-01 14:50:49 Analysis Bath Temp.: -195.658 °C
 Report Time: 2010-08-30 13:54:09 Thermal Correction: No
 Sample Mass: 12.5394 g Smoothed Pressures: No
 Warm Free Space: 23.3411 cm³ Measured Cold Free Space: 68.4296 cm³
 Equilibration Interval: 10 s Low Pressure Dose: None
 Automatic Degas: Yes

Isotherm Tabular Report

Relative Pressure (p/p ^o)	Absolute Pressure (mmHg)	Quantity Adsorbed (cm ³ /g STP)	Elapsed Time (h:min)	Saturation Pressure (mmHg)
0.011369676	8.78445	0.0346	01:45	772.77368
0.030277137	23.39250	0.0402	02:40	
0.040018971	30.91883	0.0423	02:46	
0.049545227	38.27844	0.0440	02:49	
0.059649726	46.08464	0.0456	02:52	
0.076072967	58.77240	0.0479	02:55	
0.092651437	71.57981	0.0501	02:58	
0.109018585	84.22369	0.0520	03:01	
0.158130380	122.16431	0.0570	03:04	
0.207673332	160.43777	0.0617	03:06	
0.257171288	198.67522	0.0662	03:09	
0.306382392	236.69023	0.0706	03:12	
0.355669081	274.76282	0.0750	03:15	
0.404918257	312.80560	0.0794	03:18	
0.454356458	350.99359	0.0837	03:21	
0.503683300	389.09613	0.0880	03:23	
0.553001435	427.18832	0.0924	03:27	
0.602377537	465.32755	0.0971	03:29	
0.651691297	503.41806	0.1027	03:31	
0.701084968	541.56781	0.1094	03:34	
0.766673213	592.22644	0.1209	03:37	
0.816066226	630.37390	0.1334	03:40	
0.865313465	668.41034	0.1520	03:42	
0.914006406	706.01807	0.1845	03:44	772.43768
0.960616940	742.01672	0.2669	03:46	
0.985459028	761.20569	0.4150	03:49	
0.900310763	695.43396	0.2422	03:54	
0.831075035	641.95367	0.2002	03:57	
0.800209219	618.11176	0.1875	04:01	
0.735255225	567.93884	0.1682	04:03	
0.707841948	546.76379	0.1614	04:06	
0.652009277	503.63654	0.1500	04:08	
0.596866262	461.04199	0.1404	04:10	
0.555589853	429.15854	0.1339	04:13	
0.514157150	397.15436	0.1276	04:15	
0.462022047	356.88324	0.0918	04:18	
0.403049231	311.33041	0.0819	04:21	
0.330418607	255.22778	0.0736	04:25	
0.293858364	226.98727	0.0693	04:27	
0.238206622	183.99977	0.0635	04:30	
0.211131870	163.08621	0.0604	04:33	
0.155470092	120.09096	0.0545	04:35	
0.100709959	77.79217	0.0477	04:38	

Isotherm Linear Plot





Sample: STONE2
 Operator:
 Submitter:
 File: D:\DATA\2020\EVA\STONE2.SMP

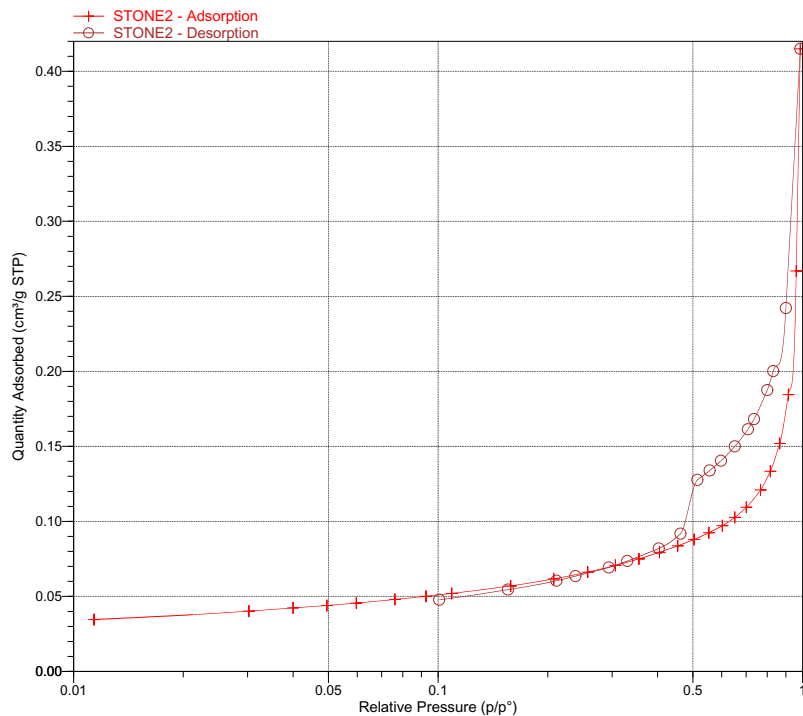
Started: 2010-07-01 9:54:31 Analysis Adsorptive: N2
 Completed: 2010-07-01 14:50:49 Analysis Bath Temp.: -195.658 °C
 Report Time: 2010-08-30 13:54:09 Thermal Correction: No
 Sample Mass: 12.5394 g Smoothed Pressures: No
 Warm Free Space: 23.3411 cm³ Measured Cold Free Space: 68.4296 cm³
 Equilibration Interval: 10 s Low Pressure Dose: None
 Automatic Degas: Yes



Sample: STONE2
 Operator:
 Submitter:
 File: D:\DATA\2020\EVA\STONE2.SMP

Started: 2010-07-01 9:54:31 Analysis Adsorptive: N2
 Completed: 2010-07-01 14:50:49 Analysis Bath Temp.: -195.658 °C
 Report Time: 2010-08-30 13:54:09 Thermal Correction: No
 Sample Mass: 12.5394 g Smoothed Pressures: No
 Warm Free Space: 23.3411 cm³ Measured Cold Free Space: 68.4296 cm³
 Equilibration Interval: 10 s Low Pressure Dose: None
 Automatic Degas: Yes

Isotherm Log Plot



BET Surface Area Report

BET Surface Area: 0.2167 ± 0.0020 m²/g
 Slope: 19.908977 ± 0.182248 g/cm³ STP
 Y-Intercept: 0.175710 ± 0.037667 g/cm³ STP
 C: 114.305845
 Qm: 0.0498 cm³/g STP
 Correlation Coefficient: 0.9997068
 Molecular Cross-Sectional Area: 0.1620 nm²

Relative Pressure (p/p ⁰)	Quantity Adsorbed (cm ³ /g STP)	1/[Q(p ⁰ p - 1)]
0.059649726	0.0456	1.392122
0.076072967	0.0479	1.717278
0.092651437	0.0501	2.039153
0.109018585	0.0520	2.352795
0.158130380	0.0570	3.293853
0.207673332	0.0617	4.248638
0.257171288	0.0662	5.229663
0.306382392	0.0706	6.252692
0.355669081	0.0750	7.355902



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Sample: STONE2
 Operator:
 Submitter:
 File: D:\DATA\2020\EVA\STONE2.SMP

Started: 2010-07-01 9:54:31	Analysis Adsorptive: N2
Completed: 2010-07-01 14:50:49	Analysis Bath Temp.: -195.658 °C
Report Time: 2010-08-30 13:54:09	Thermal Correction: No
Sample Mass: 12.5394 g	Smoothed Pressures: No
Warm Free Space: 23.3411 cm ³ Measured	Cold Free Space: 68.4296 cm ³
Equilibration Interval: 10 s	Low Pressure Dose: None
Automatic Degas: Yes	

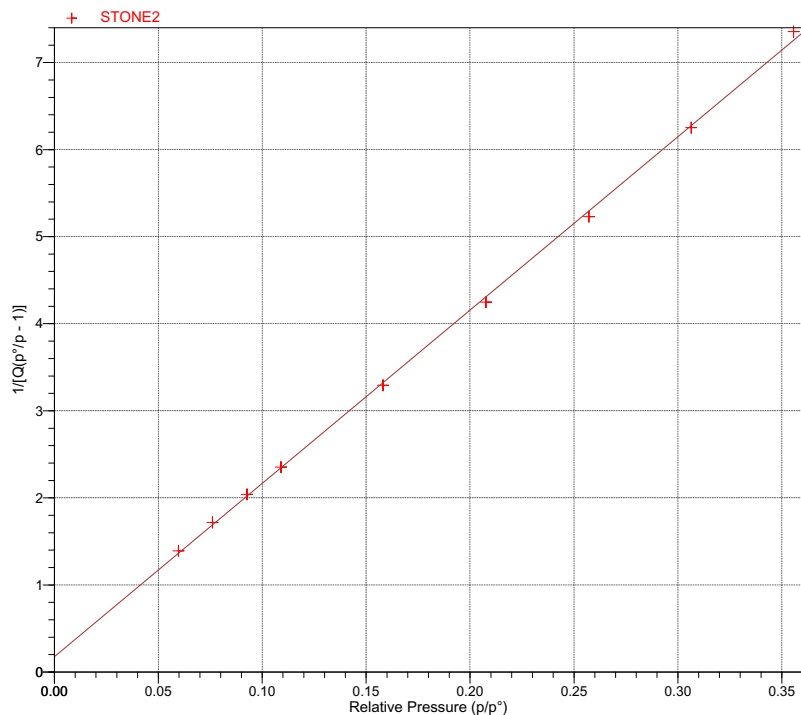


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Sample: STONE2
 Operator:
 Submitter:
 File: D:\DATA\2020\EVA\STONE2.SMP

Started: 2010-07-01 9:54:31	Analysis Adsorptive: N2
Completed: 2010-07-01 14:50:49	Analysis Bath Temp.: -195.658 °C
Report Time: 2010-08-30 13:54:09	Thermal Correction: No
Sample Mass: 12.5394 g	Smoothed Pressures: No
Warm Free Space: 23.3411 cm ³ Measured	Cold Free Space: 68.4296 cm ³
Equilibration Interval: 10 s	Low Pressure Dose: None
Automatic Degas: Yes	

BET Surface Area Plot



Langmuir Reports

Primary Data
 4052- Fewer than two points are selected for this report.



Sample: STONE2
 Operator:
 Submitter:
 File: D:\DATA\2020\EVA\STONE2.SMP

Started: 2010-07-01 9:54:31 Analysis Adsorptive: N2
 Completed: 2010-07-01 14:50:49 Analysis Bath Temp.: -195.658 °C
 Report Time: 2010-08-30 13:54:09 Thermal Correction: No
 Sample Mass: 12.5394 g Smoothed Pressures: No
 Warm Free Space: 23.3411 cm³ Measured Cold Free Space: 68.4296 cm³
 Equilibration Interval: 10 s Low Pressure Dose: None
 Automatic Degas: Yes

t-Plot Report

Micropore Volume: -0.000003 cm³/g STP
 Micropore Area: *
 External Surface Area: 0.2233 m²/g
 Slope: 0.014438 ± 0.000070 cm³/g·Å STP
 Y-Intercept: -0.002130 ± 0.000288 cm³/g STP
 Correlation Coefficient: 0.999965
 Surface Area Correction Factor: 1.000
 Density Conversion Factor: 0.0015468
 Total Surface Area (BET): 0.2167 m²/g
 Thickness Range: 3.5000 Å to 5.0000 Å
 Thickness Equation: Harkins and Jura
 $t = [13.99 / (0.034 - \log(p/p^0))] ^ 0.5$

Relative Pressure (p/p ⁰)	Statistical Thickness (Å)	Quantity Adsorbed (cm³/g STP)
0.011369676	2.6593	0.0346
0.030277137	3.0015	0.0402
0.040018971	3.1259	0.0423
0.049545227	3.2324	0.0440
0.059649726	3.3343	0.0456
0.076072967	3.4837	0.0479
0.092651437	3.6207	0.0501
0.109018585	3.7469	0.0520
0.158130380	4.0933	0.0570
0.207673332	4.4184	0.0617
0.257171288	4.7358	0.0662
0.306382392	5.0539	0.0706
0.355669081	5.3822	0.0750
0.404918257	5.7264	0.0794
0.454356458	6.0949	0.0837
0.503683300	6.4930	0.0880
0.553001435	6.9304	0.0924
0.602377537	7.4196	0.0971
0.651691297	7.9752	0.1027
0.701084968	8.6211	0.1094
0.766673213	9.6772	0.1209
0.816066226	10.6965	0.1334
0.865313465	12.0202	0.1520
0.914006406	13.8387	0.1845
0.960616940	16.4899	0.2669
0.985459028	18.6177	0.4150

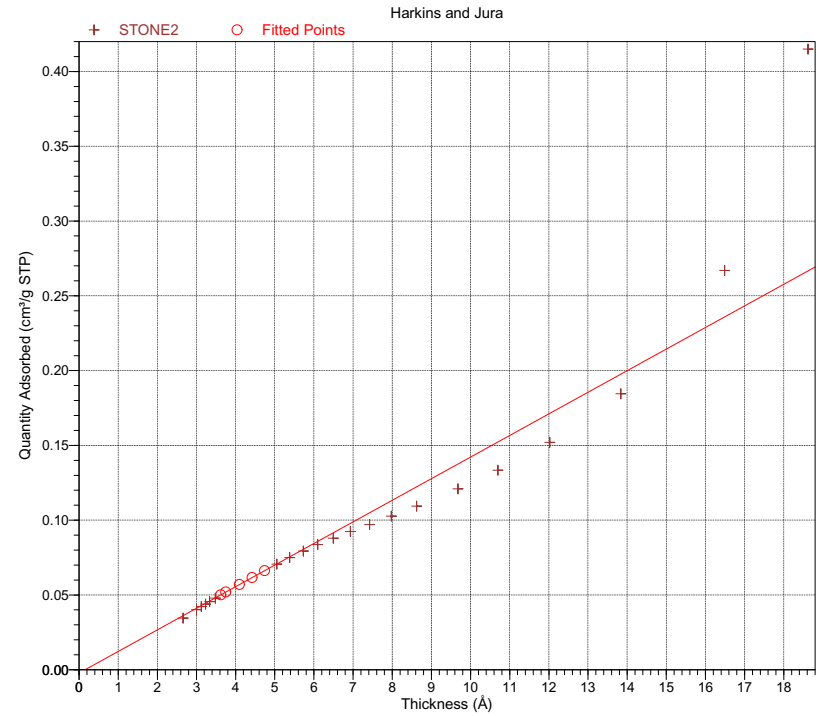
* The micropore area is not reported because either the micropore volume is negative or the calculated external surface area is larger than the total surface area.



Sample: STONE2
 Operator:
 Submitter:
 File: D:\DATA\2020\EVA\STONE2.SMP

Started: 2010-07-01 9:54:31 Analysis Adsorptive: N2
 Completed: 2010-07-01 14:50:49 Analysis Bath Temp.: -195.658 °C
 Report Time: 2010-08-30 13:54:09 Thermal Correction: No
 Sample Mass: 12.5394 g Smoothed Pressures: No
 Warm Free Space: 23.3411 cm³ Measured Cold Free Space: 68.4296 cm³
 Equilibration Interval: 10 s Low Pressure Dose: None
 Automatic Degas: Yes

t-Plot





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Sample: STONE2
 Operator:
 Submitter:
 File: D:\DATA\2020\EVA\STONE2.SMP

Started: 2010-07-01 9:54:31 Analysis Adsorptive: N2
 Completed: 2010-07-01 14:50:49 Analysis Bath Temp.: -195.658 °C
 Report Time: 2010-08-30 13:54:09 Thermal Correction: No
 Sample Mass: 12.5394 g Smoothed Pressures: No
 Warm Free Space: 23.3411 cm³ Measured Cold Free Space: 68.4296 cm³
 Equilibration Interval: 10 s Low Pressure Dose: None
 Automatic Degas: Yes

BJH Adsorption Pore Distribution Report

$t = 3.54 [-5 / \ln(p/p^*)]^{\wedge} 0.333$

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)
1347.7 - 506.8	606.0	0.000256	0.000256	0.017	0.017
506.8 - 236.1	281.5	0.000144	0.000400	0.021	0.037
236.1 - 151.9	175.5	0.000055	0.000455	0.013	0.050
151.9 - 111.5	125.1	0.000031	0.000487	0.010	0.060
111.5 - 87.7	96.5	0.000021	0.000507	0.009	0.069
87.7 - 67.9	75.0	0.000019	0.000526	0.010	0.079
67.9 - 57.7	61.9	0.000011	0.000537	0.007	0.086
57.7 - 49.9	53.2	0.000009	0.000546	0.007	0.092
49.9 - 43.7	46.3	0.000007	0.000553	0.006	0.098
43.7 - 38.6	40.8	0.000007	0.000560	0.007	0.105
38.6 - 34.4	36.2	0.000007	0.000567	0.008	0.113
34.4 - 30.7	32.3	0.000008	0.000575	0.009	0.122
30.7 - 27.5	28.9	0.000008	0.000583	0.011	0.134
27.5 - 24.7	25.9	0.000008	0.000591	0.013	0.147
24.7 - 22.1	23.2	0.000008	0.000599	0.015	0.161
22.1 - 19.7	20.7	0.000008	0.000608	0.016	0.177
19.7 - 17.3	18.3	0.000008	0.000616	0.018	0.196

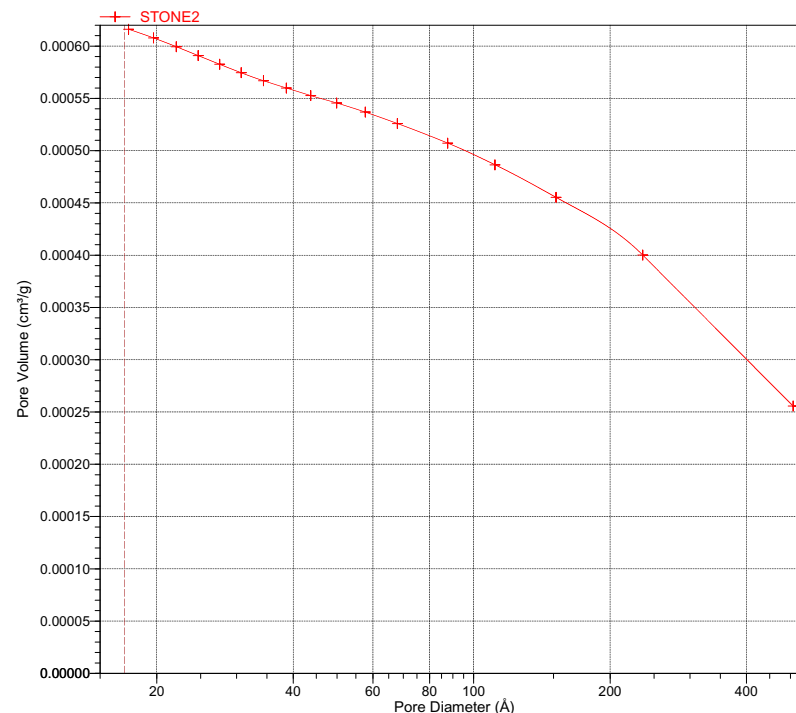


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Sample: STONE2
 Operator:
 Submitter:
 File: D:\DATA\2020\EVA\STONE2.SMP

Started: 2010-07-01 9:54:31 Analysis Adsorptive: N2
 Completed: 2010-07-01 14:50:49 Analysis Bath Temp.: -195.658 °C
 Report Time: 2010-08-30 13:54:09 Thermal Correction: No
 Sample Mass: 12.5394 g Smoothed Pressures: No
 Warm Free Space: 23.3411 cm³ Measured Cold Free Space: 68.4296 cm³
 Equilibration Interval: 10 s Low Pressure Dose: None
 Automatic Degas: Yes

BJH Adsorption Cumulative Pore Volume





ASAP 2020 V1.05 H

Unit 1

Serial #: 182

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Sample: STONE2
 Operator:
 Submitter:
 File: D:\DATA\2020\EVA\STONE2.SMP

Started: 2010-07-01 9:54:31
 Completed: 2010-07-01 14:50:49
 Report Time: 2010-08-30 13:54:09
 Sample Mass: 12.5394 g
 Warm Free Space: 23.3411 cm³ Measured
 Equilibration Interval: 10 s
 Automatic Degas: Yes

Analysis Adsorptive: N2
 Analysis Bath Temp.: -195.658 °C
 Thermal Correction: No
 Smoothed Pressures: No
 Cold Free Space: 68.4296 cm³
 Low Pressure Dose: None



ASAP 2020 V1.05 H

Unit 1

Serial #: 182

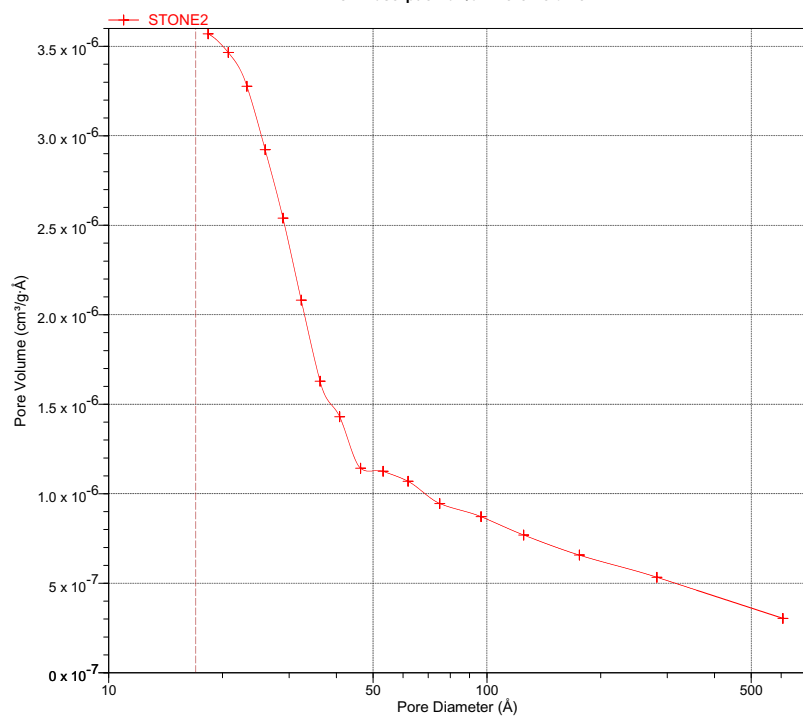
Page 12

Sample: STONE2
 Operator:
 Submitter:
 File: D:\DATA\2020\EVA\STONE2.SMP

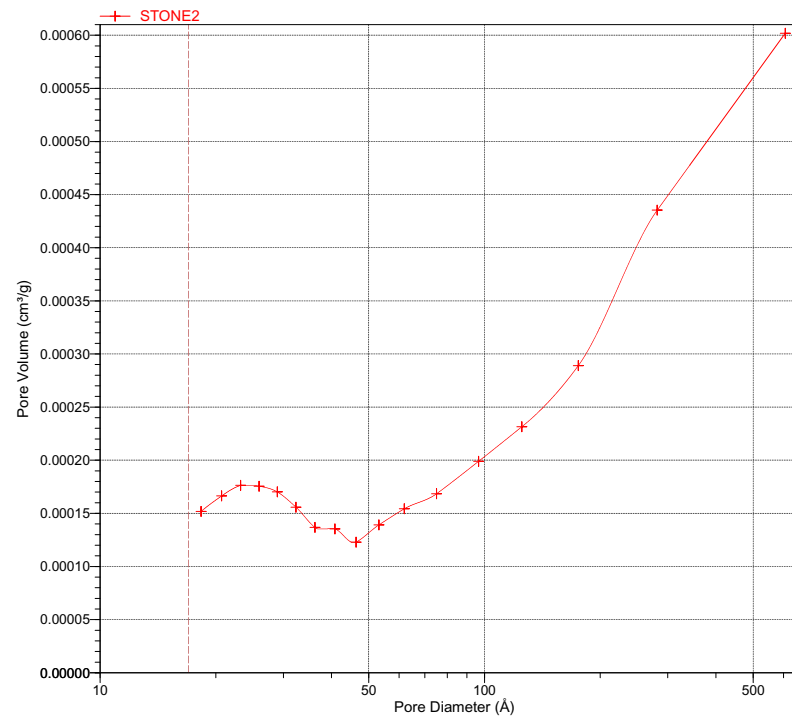
Started: 2010-07-01 9:54:31
 Completed: 2010-07-01 14:50:49
 Report Time: 2010-08-30 13:54:09
 Sample Mass: 12.5394 g
 Warm Free Space: 23.3411 cm³ Measured
 Equilibration Interval: 10 s
 Automatic Degas: Yes

Analysis Adsorptive: N2
 Analysis Bath Temp.: -195.658 °C
 Thermal Correction: No
 Smoothed Pressures: No
 Cold Free Space: 68.4296 cm³
 Low Pressure Dose: None

BJH Adsorption dV/dD Pore Volume



BJH Adsorption dV/dlog(D) Pore Volume





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Unit 1

Serial #: 182

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Sample: STONE2
 Operator:
 Submitter:
 File: D:\DATA\2020\EVA\STONE2.SMP

Started: 2010-07-01 9:54:31
 Completed: 2010-07-01 14:50:49
 Report Time: 2010-08-30 13:54:09
 Sample Mass: 12.5394 g
 Warm Free Space: 23.3411 cm³ Measured
 Equilibration Interval: 10 s
 Automatic Degas: Yes

Analysis Adsorptive: N₂
 Analysis Bath Temp.: -195.658 °C
 Thermal Correction: No
 Smoothed Pressures: No
 Cold Free Space: 68.4296 cm³
 Low Pressure Dose: None



ASAP 2020 V1.05 H

Unit 1

Serial #: 182

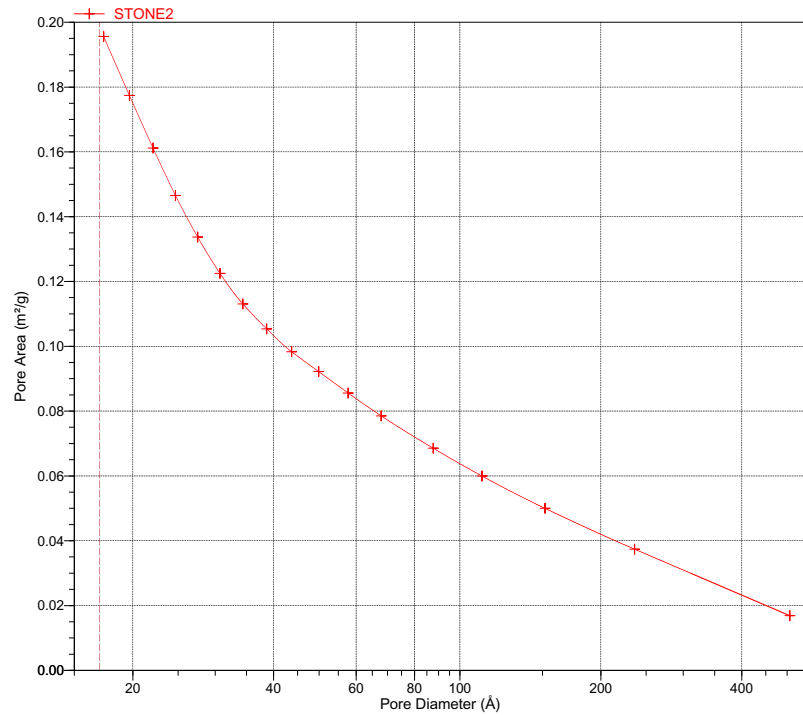
Page 14

Sample: STONE2
 Operator:
 Submitter:
 File: D:\DATA\2020\EVA\STONE2.SMP

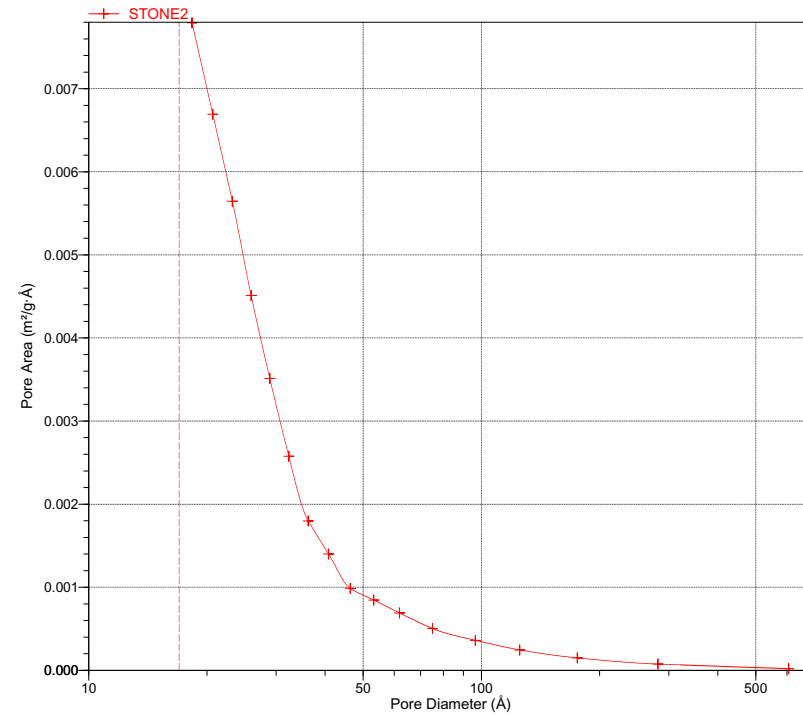
Started: 2010-07-01 9:54:31
 Completed: 2010-07-01 14:50:49
 Report Time: 2010-08-30 13:54:09
 Sample Mass: 12.5394 g
 Warm Free Space: 23.3411 cm³ Measured
 Equilibration Interval: 10 s
 Automatic Degas: Yes

Analysis Adsorptive: N₂
 Analysis Bath Temp.: -195.658 °C
 Thermal Correction: No
 Smoothed Pressures: No
 Cold Free Space: 68.4296 cm³
 Low Pressure Dose: None

BJH Adsorption Cumulative Pore Area



BJH Adsorption dA/dD Pore Area

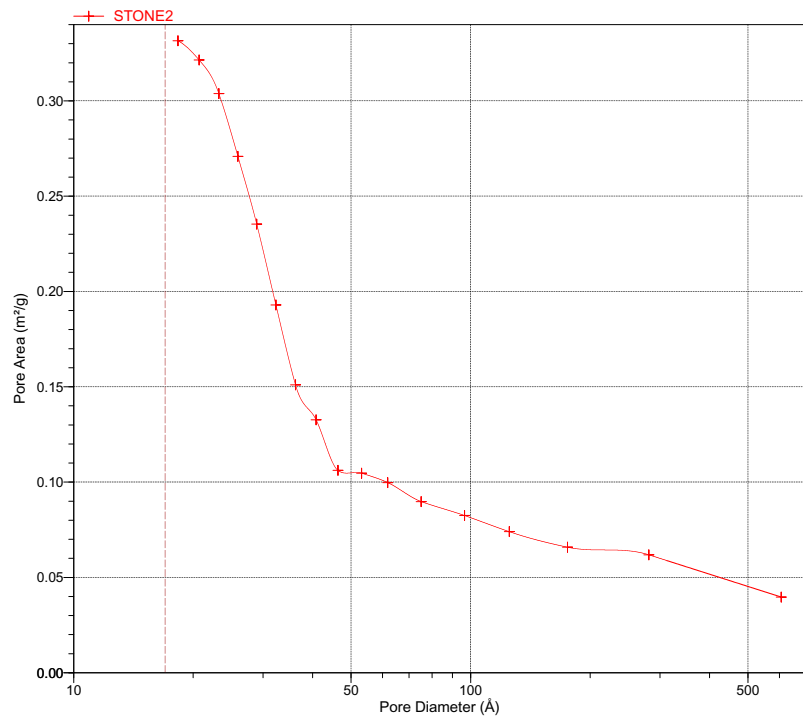




Sample: STONE2
 Operator:
 Submitter:
 File: D:\DATA\2020\EVA\STONE2.SMP

Started: 2010-07-01 9:54:31 Analysis Adsorptive: N2
 Completed: 2010-07-01 14:50:49 Analysis Bath Temp.: -195.658 °C
 Report Time: 2010-08-30 13:54:09 Thermal Correction: No
 Sample Mass: 12.5394 g Smoothed Pressures: No
 Warm Free Space: 23.3411 cm³ Measured Cold Free Space: 68.4296 cm³
 Equilibration Interval: 10 s Low Pressure Dose: None
 Automatic Degas: Yes

BJH Adsorption dA/dlog(D) Pore Area



Sample: STONE2
 Operator:
 Submitter:
 File: D:\DATA\2020\EVA\STONE2.SMP

Started: 2010-07-01 9:54:31 Analysis Adsorptive: N2
 Completed: 2010-07-01 14:50:49 Analysis Bath Temp.: -195.658 °C
 Report Time: 2010-08-30 13:54:09 Thermal Correction: No
 Sample Mass: 12.5394 g Smoothed Pressures: No
 Warm Free Space: 23.3411 cm³ Measured Cold Free Space: 68.4296 cm³
 Equilibration Interval: 10 s Low Pressure Dose: None
 Automatic Degas: Yes

Horvath-Kawazoe Report

Slit Pore Geometry (Original H-K)

Maximum Pore Volume: 0.000642 cm³/g
 at Relative Pressure: 0.985459028
 Median Pore Width: 497.903 Å
 Relative Pressure Range: 1.137e-02 to 9.855e-01

Diameter of Adsorptive Molecule: 3.000 Å
 Diameter of Adsorptive at Zero Interaction Energy: 2.574 Å
 Diameter of Sample Atom: 3.040 Å
 Diameter of Sample Atom at Zero Interaction Energy: 2.609 Å
 Interaction Parameter: 3.49e-43 erg·cm⁴

Density Conversion Factor: 0.0015468

Absolute Pressure (mmHg)	Relative Pressure (p/p [*])	Quantity Adsorbed (cm ³ /g STP)	Pore Width (Å)	Cumulative Pore Volume (cm ³ /g)	Differential Pore Volume (cm ³ /g·Å)
8.78445	0.011369676	0.0346	10.432	0.0001	0.0000
23.39250	0.030277137	0.0402	12.635	0.0001	0.0000
30.91883	0.040018971	0.0423	13.497	0.0001	0.0000
38.27844	0.049545227	0.0440	14.269	0.0001	0.0000
46.08464	0.059649726	0.0456	15.031	0.0001	0.0000
58.77240	0.076072967	0.0479	16.187	0.0001	0.0000
71.57981	0.092651437	0.0501	17.303	0.0001	0.0000
84.22369	0.109018585	0.0520	18.360	0.0001	0.0000
122.16431	0.158130380	0.0570	21.506	0.0001	0.0000
160.43777	0.207673332	0.0617	24.722	0.0001	0.0000
198.67522	0.257171288	0.0662	28.164	0.0001	0.0000
236.69023	0.306382392	0.0706	31.909	0.0001	0.0000
274.76282	0.355669081	0.0750	36.103	0.0001	0.0000
312.80560	0.404918257	0.0794	40.839	0.0001	0.0000
350.99359	0.454356458	0.0837	46.324	0.0001	0.0000
389.09613	0.503683300	0.0880	52.840	0.0001	0.0000
427.18832	0.553001435	0.0924	60.719	0.0001	0.0000
465.32755	0.602377537	0.0971	70.411	0.0002	0.0000
503.41806	0.651691297	0.1027	82.897	0.0002	0.0000
541.56781	0.701084968	0.1094	99.225	0.0002	0.0000
592.22644	0.766673213	0.1209	131.950	0.0002	0.0000
630.37390	0.816066226	0.1334	171.097	0.0002	0.0000
668.41034	0.865313465	0.1520	240.752	0.0002	0.0000
706.01807	0.914006406	0.1845	387.027	0.0003	0.0000
742.01672	0.960616940	0.2669	855.108	0.0004	0.0000
761.20569	0.985459028	0.4150	2228.144	0.0006	0.0000



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Sample: STONE2
 Operator:
 Submitter:
 File: D:\DATA\2020\EVA\STONE2.SMP

Started: 2010-07-01 9:54:31 Analysis Adsorptive: N2
 Completed: 2010-07-01 14:50:49 Analysis Bath Temp.: -195.658 °C
 Report Time: 2010-08-30 13:54:09 Thermal Correction: No
 Sample Mass: 12.5394 g Smoothed Pressures: No
 Warm Free Space: 23.3411 cm³ Measured Cold Free Space: 68.4296 cm³
 Equilibration Interval: 10 s Low Pressure Dose: None
 Automatic Degas: Yes

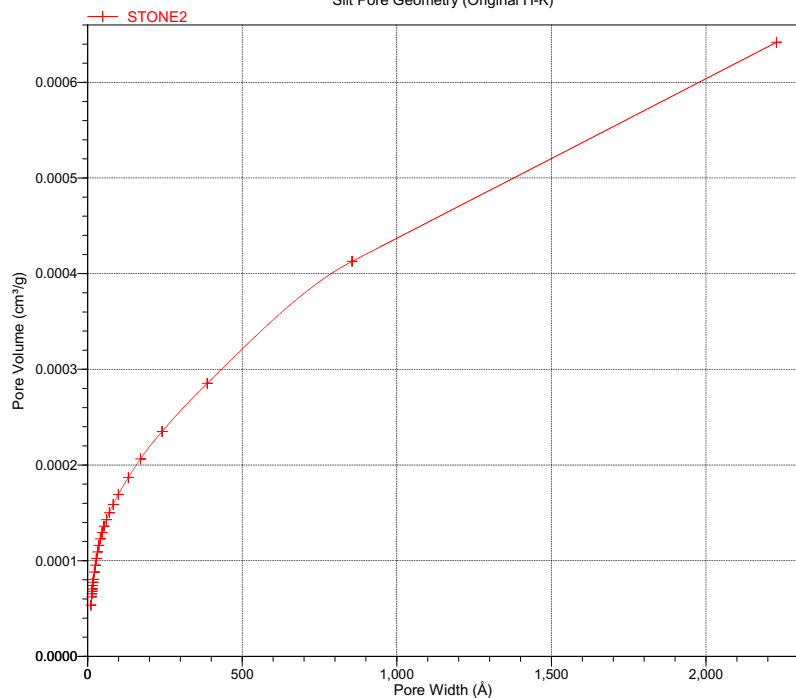


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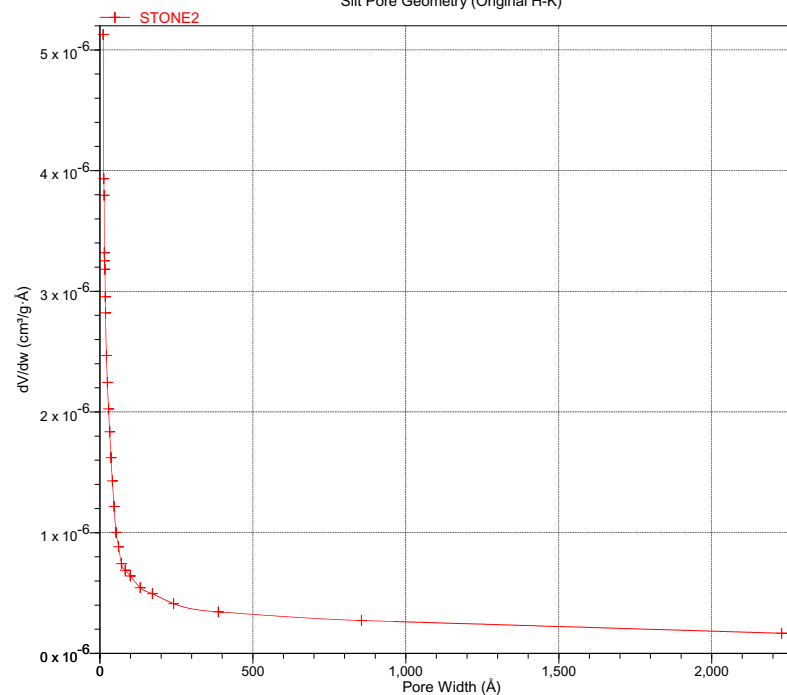
Sample: STONE2
 Operator:
 Submitter:
 File: D:\DATA\2020\EVA\STONE2.SMP

Started: 2010-07-01 9:54:31 Analysis Adsorptive: N2
 Completed: 2010-07-01 14:50:49 Analysis Bath Temp.: -195.658 °C
 Report Time: 2010-08-30 13:54:09 Thermal Correction: No
 Sample Mass: 12.5394 g Smoothed Pressures: No
 Warm Free Space: 23.3411 cm³ Measured Cold Free Space: 68.4296 cm³
 Equilibration Interval: 10 s Low Pressure Dose: None
 Automatic Degas: Yes

Horvath-Kawazoe Cumulative Pore Volume Plot
 Slit Pore Geometry (Original H-K)



Horvath-Kawazoe Differential Pore Volume Plot
 Slit Pore Geometry (Original H-K)





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Sample: STONE2
 Operator:
 Submitter:
 File: D:\DATA\2020\EVA\STONE2.SMP

Started: 2010-07-01 9:54:31	Analysis Adsorptive: N2
Completed: 2010-07-01 14:50:49	Analysis Bath Temp.: -195.658 °C
Report Time: 2010-08-30 13:54:09	Thermal Correction: No
Sample Mass: 12.5394 g	Smoothed Pressures: No
Warm Free Space: 23.3411 cm ³ Measured	Cold Free Space: 68.4296 cm ³
Equilibration Interval: 10 s	Low Pressure Dose: None
Automatic Degas: Yes	

Summary Report

Surface Area

Single point surface area at $p/p^* = 0.306382392$: 0.2133 m²/g

BET Surface Area: 0.2167 m²/g

t-Plot External Surface Area: 0.2233 m²/g

BJH Adsorption cumulative surface area of pores
 between 17.000 Å and 3000.000 Å diameter: 0.1956 m²/g

BJH Desorption cumulative surface area of pores
 between 17.000 Å and 3000.000 Å diameter: 0.3062 m²/g

Pore Volume

Single point adsorption total pore volume of pores
 less than 1350.6100 Å at $p/p^* = 0.985459028$: 0.000642 cm³/g

t-Plot micropore volume: -0.000003 cm³/g

BJH Adsorption cumulative volume of pores
 between 17.000 Å and 3000.000 Å diameter: 0.000616 cm³/g

BJH Desorption cumulative volume of pores
 between 17.000 Å and 3000.000 Å diameter: 0.000377 cm³/g

Pore Size

Adsorption average pore width (4V/A by BET): 118.4574 Å

BJH Adsorption average pore diameter (4V/A): 126.012 Å

BJH Desorption average pore diameter (4V/A): 49.201 Å

Horvath-Kawazoe

Maximum pore volume at $p/p^* = 0.985459028$: 0.000642 cm³/g

Median pore width: 497.9027 Å

Dubinin-Radushkevich

Micropore surface area: 0.0000 m²/g

Monolayer capacity: 0.000000 cm³/g

Dubinin-Astakhov

Micropore surface area: 0.2171 m²/g

Limiting micropore volume: 0.000110 cm³/g



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Serial #: 182

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Sample: STONE2
 Operator:
 Submitter:
 File: D:\DATA\2020\EVA\STONE2.SMP

Started: 2010-07-01 9:54:31	Analysis Adsorptive: N2
Completed: 2010-07-01 14:50:49	Analysis Bath Temp.: -195.658 °C
Report Time: 2010-08-30 13:54:09	Thermal Correction: No
Sample Mass: 12.5394 g	Smoothed Pressures: No
Warm Free Space: 23.3411 cm ³ Measured	Cold Free Space: 68.4296 cm ³
Equilibration Interval: 10 s	Low Pressure Dose: None
Automatic Degas: Yes	

Dubinin-Astakhov

MP-Method

Cumulative surface area of pores between
 18.6177 Å and 18.6177 Å hydraulic radius: 0.0000 m²/g

Cumulative pore volume of pores between
 18.6177 Å and 18.6177 Å hydraulic radius: 0.000000 cm³/g

Average pore hydraulic radius (V/A): 0.0000 Å

A2.10 N₂ adsorption isotherms (as referenced to in Section 3.2.1) for the M sample size fraction 2–3 mm



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Page 1

Sample: STONE6
 Operator:
 Submitter:
 File: D:\DATA\2020\EVA\STONE6.SMP

Started: 2010-08-26 9:13:17
 Completed: 2010-08-26 13:13:33
 Report Time: 2010-08-30 13:51:20
 Sample Mass: 13.0402 g
 Warm Free Space: 23.1536 cm³ Measured
 Equilibration Interval: 10 s
 Automatic Degas: Yes

Analysis Adsorptive: N2
 Analysis Bath Temp.: -195.741 °C
 Thermal Correction: No
 Smoothed Pressures: No
 Cold Free Space: 68.7163 cm³
 Low Pressure Dose: None

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Unit 1

Serial #: 182

Page 2

Sample: STONE6
 Operator:
 Submitter:
 File: D:\DATA\2020\EVA\STONE6.SMP

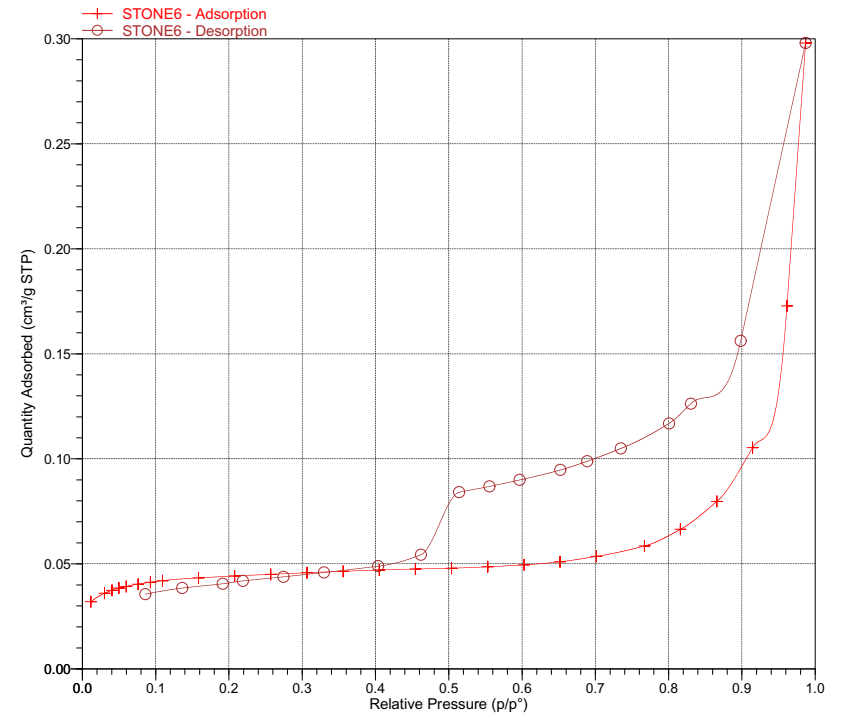
Started: 2010-08-26 9:13:17
 Completed: 2010-08-26 13:13:33
 Report Time: 2010-08-30 13:51:20
 Sample Mass: 13.0402 g
 Warm Free Space: 23.1536 cm³ Measured
 Equilibration Interval: 10 s
 Automatic Degas: Yes

Analysis Adsorptive: N2
 Analysis Bath Temp.: -195.741 °C
 Thermal Correction: No
 Smoothed Pressures: No
 Cold Free Space: 68.7163 cm³
 Low Pressure Dose: None

Isotherm Tabular Report

Relative Pressure (p/p°)	Absolute Pressure (mmHg)	Quantity Adsorbed (cm ³ /g STP)	Elapsed Time (h:min)	Saturation Pressure (mmHg)
				765.46100
0.011477297	8.78236	0.0320	01:02	
0.030256591	23.15161	0.0360	01:46	
0.040340685	30.86697	0.0374	01:49	
0.049682604	38.01411	0.0385	01:52	
0.059682726	45.66487	0.0393	01:55	
0.076073161	58.20425	0.0403	01:57	
0.092731039	70.94765	0.0412	02:00	
0.109173945	83.52663	0.0412	02:03	
0.158510260	121.26894	0.0420	02:05	
0.207824997	158.99486	0.0433	02:09	
0.257162967	196.73579	0.0442	02:11	
0.306512921	234.48596	0.0450	02:14	
0.355829628	272.20734	0.0458	02:16	
0.405137713	309.92032	0.0465	02:19	
0.454504756	347.67661	0.0471	02:22	
0.503796744	385.37674	0.0476	02:25	
0.553162272	423.12857	0.0479	02:27	
0.602646091	460.96909	0.0486	02:30	
0.651839070	498.58929	0.0495	02:33	
0.701291295	536.40234	0.0510	02:35	
0.767101640	586.72992	0.0536	02:38	
0.816132280	624.21692	0.0585	02:40	
0.865799752	662.19446	0.0664	02:43	
0.914554978	699.47308	0.0797	02:45	
0.961349310	735.23914	0.1053	02:47	
0.986796310	754.67102	0.1728	02:51	
0.898330916	686.99908	0.2980	02:56	
0.830531294	635.13416	0.1561	02:59	
		0.1263	03:02	
			03:04	764.72021
0.800629666	612.25769	0.1169	03:07	
0.734738661	561.86951	0.1049	03:09	
0.688899015	526.81500	0.0989	03:12	
0.652146757	498.70981	0.0947	03:15	
0.596779030	456.36899	0.0899	03:18	
0.555585539	424.86749	0.0869	03:20	
0.514276358	393.27753	0.0841	03:24	
0.462019450	353.31561	0.0841	03:24	
0.403622353	308.65817	0.0544	03:27	
0.329662641	252.09969	0.0489	03:30	
0.274374029	209.81937	0.0459	03:32	
0.219108862	167.55698	0.0438	03:35	
0.191480848	146.42928	0.0419	03:37	
0.136380188	104.29269	0.0405	03:40	
0.085910618	65.69759	0.0385	03:43	
		0.0356	03:45	

Isotherm Linear Plot





Sample: STONE6
 Operator:
 Submitter:
 File: D:\DATA\2020\EVA\STONE6.SMP

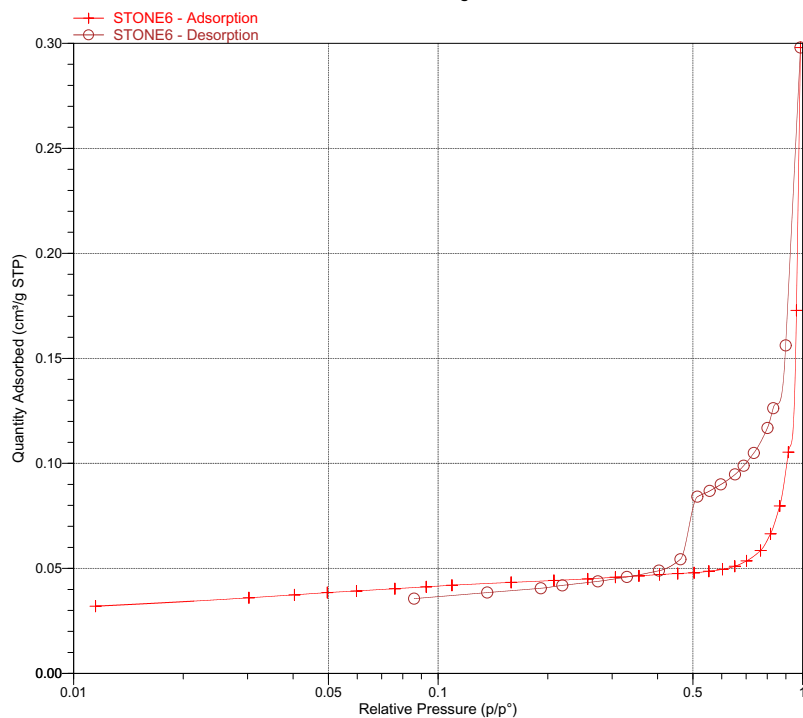
Started: 2010-08-26 9:13:17 Analysis Adsorptive: N2
 Completed: 2010-08-26 13:13:33 Analysis Bath Temp.: -195.741 °C
 Report Time: 2010-08-30 13:51:20 Thermal Correction: No
 Sample Mass: 13.0402 g Smoothed Pressures: No
 Warm Free Space: 23.1536 cm³ Measured Cold Free Space: 68.7163 cm³
 Equilibration Interval: 10 s Low Pressure Dose: None
 Automatic Degas: Yes



Sample: STONE6
 Operator:
 Submitter:
 File: D:\DATA\2020\EVA\STONE6.SMP

Started: 2010-08-26 9:13:17 Analysis Adsorptive: N2
 Completed: 2010-08-26 13:13:33 Analysis Bath Temp.: -195.741 °C
 Report Time: 2010-08-30 13:51:20 Thermal Correction: No
 Sample Mass: 13.0402 g Smoothed Pressures: No
 Warm Free Space: 23.1536 cm³ Measured Cold Free Space: 68.7163 cm³
 Equilibration Interval: 10 s Low Pressure Dose: None
 Automatic Degas: Yes

Isotherm Log Plot



BET Surface Area Report

BET Surface Area: 0.1309 ± 0.0044 m²/g
 Slope: 33.986334 ± 1.099654 g/cm³ STP
 Y-Intercept: -0.735076 ± 0.227404 g/cm³ STP
 C: -45.235115
 Qm: 0.0301 cm³/g STP
 Correlation Coefficient: 0.9963559
 Molecular Cross-Sectional Area: 0.1620 nm²

Relative Pressure (p/p ⁰)	Quantity Adsorbed (cm ³ /g STP)	1/[Q(p ⁰ /p - 1)]
0.059682726	0.0393	1.616728
0.076073161	0.0403	2.040584
0.092731039	0.0412	2.480224
0.109173945	0.0420	2.918276
0.158510260	0.0433	4.347179
0.207824997	0.0442	5.930485
0.257162967	0.0450	7.688889
0.306512921	0.0458	9.652403
0.355829628	0.0465	11.886416



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Sample: STONE6
 Operator:
 Submitter:
 File: D:\DATA\2020\EVA\STONE6.SMP

Started: 2010-08-26 9:13:17	Analysis Adsorptive: N2
Completed: 2010-08-26 13:13:33	Analysis Bath Temp.: -195.741 °C
Report Time: 2010-08-30 13:51:20	Thermal Correction: No
Sample Mass: 13.0402 g	Smoothed Pressures: No
Warm Free Space: 23.1536 cm ³ Measured	Cold Free Space: 68.7163 cm ³
Equilibration Interval: 10 s	Low Pressure Dose: None
Automatic Degas: Yes	

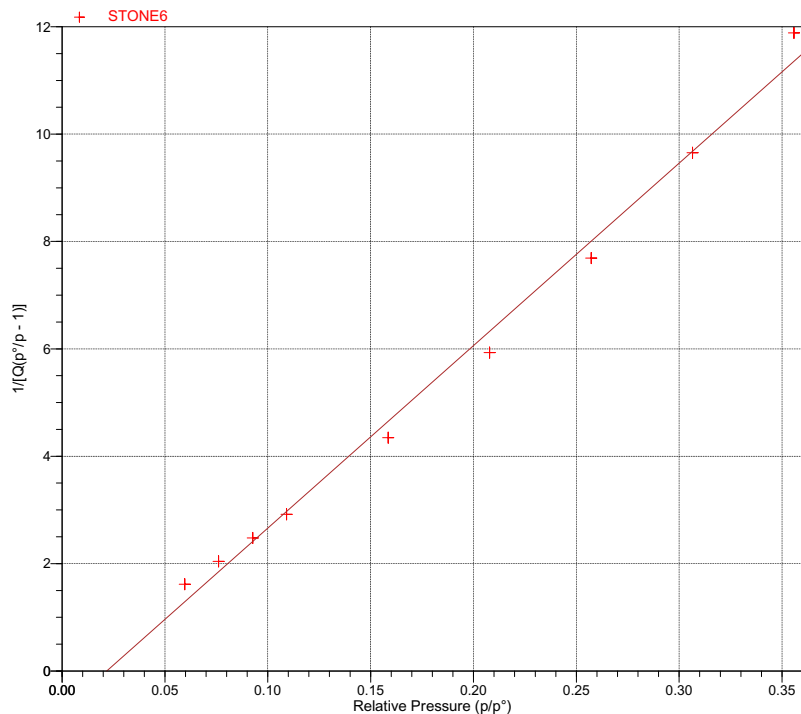


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Sample: STONE6
 Operator:
 Submitter:
 File: D:\DATA\2020\EVA\STONE6.SMP

Started: 2010-08-26 9:13:17	Analysis Adsorptive: N2
Completed: 2010-08-26 13:13:33	Analysis Bath Temp.: -195.741 °C
Report Time: 2010-08-30 13:51:20	Thermal Correction: No
Sample Mass: 13.0402 g	Smoothed Pressures: No
Warm Free Space: 23.1536 cm ³ Measured	Cold Free Space: 68.7163 cm ³
Equilibration Interval: 10 s	Low Pressure Dose: None
Automatic Degas: Yes	

BET Surface Area Plot



Langmuir Reports

Primary Data
 4052- Fewer than two points are selected for this report.



Sample: STONE6
 Operator:
 Submitter:
 File: D:\DATA\2020\EVA\STONE6.SMP

Started: 2010-08-26 9:13:17 Analysis Adsorptive: N2
 Completed: 2010-08-26 13:13:33 Analysis Bath Temp.: -195.741 °C
 Report Time: 2010-08-30 13:51:20 Thermal Correction: No
 Sample Mass: 13.0402 g Smoothed Pressures: No
 Warm Free Space: 23.1536 cm³ Measured Cold Free Space: 68.7163 cm³
 Equilibration Interval: 10 s Low Pressure Dose: None
 Automatic Degas: Yes

t-Plot Report

Micropore Volume: 0.000045 cm³/g STP
 Micropore Area: 0.0790 m²/g
 External Surface Area: 0.0519 m²/g
 Slope: 0.003354 ± 0.000274 cm³/g·Å STP
 Y-Intercept: 0.029325 ± 0.001134 cm³/g STP
 Correlation Coefficient: 0.990166
 Surface Area Correction Factor: 1.000
 Density Conversion Factor: 0.0015468
 Total Surface Area (BET): 0.1309 m²/g
 Thickness Range: 3.5000 Å to 5.0000 Å
 Thickness Equation: Harkins and Jura
 $t = [13.99 / (0.034 - \log(p/p^0))] ^ 0.5$

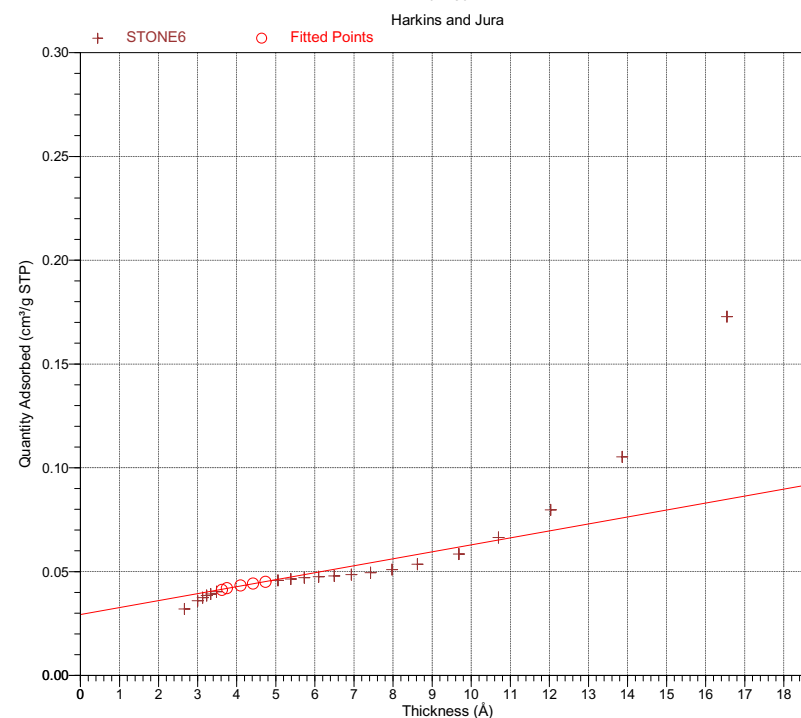
Relative Pressure (p/p ⁰)	Statistical Thickness (Å)	Quantity Adsorbed (cm³/g STP)
0.011477297	2.6621	0.0320
0.030256591	3.0012	0.0360
0.040340685	3.1297	0.0374
0.049682604	3.2338	0.0385
0.059682726	3.3346	0.0393
0.076073161	3.4837	0.0403
0.092731039	3.6214	0.0412
0.109173945	3.7480	0.0420
0.158510260	4.0958	0.0433
0.207824997	4.4194	0.0442
0.257162967	4.7358	0.0450
0.306512921	5.0547	0.0458
0.355829628	5.3832	0.0465
0.405137713	5.7280	0.0471
0.454504756	6.0961	0.0476
0.503796744	6.4939	0.0479
0.553162272	6.9319	0.0486
0.602646091	7.4224	0.0495
0.651839070	7.9769	0.0510
0.701291295	8.6241	0.0536
0.767101640	9.6850	0.0585
0.816132280	10.6980	0.0664
0.865799752	12.0354	0.0797
0.914554978	13.8635	0.1053
0.961349310	16.5432	0.1728
0.986796310	18.7550	0.2980



Sample: STONE6
 Operator:
 Submitter:
 File: D:\DATA\2020\EVA\STONE6.SMP

Started: 2010-08-26 9:13:17 Analysis Adsorptive: N2
 Completed: 2010-08-26 13:13:33 Analysis Bath Temp.: -195.741 °C
 Report Time: 2010-08-30 13:51:20 Thermal Correction: No
 Sample Mass: 13.0402 g Smoothed Pressures: No
 Warm Free Space: 23.1536 cm³ Measured Cold Free Space: 68.7163 cm³
 Equilibration Interval: 10 s Low Pressure Dose: None
 Automatic Degas: Yes

t-Plot





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Sample: STONE6
 Operator:
 Submitter:
 File: D:\DATA\2020\EVA\STONE6.SMP

Started: 2010-08-26 9:13:17 Analysis Adsorptive: N2
 Completed: 2010-08-26 13:13:33 Analysis Bath Temp.: -195.741 °C
 Report Time: 2010-08-30 13:51:20 Thermal Correction: No
 Sample Mass: 13.0402 g Smoothed Pressures: No
 Warm Free Space: 23.1536 cm³ Measured Cold Free Space: 68.7163 cm³
 Equilibration Interval: 10 s Low Pressure Dose: None
 Automatic Degas: Yes

BJH Adsorption Pore Distribution Report

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

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 (cm³/g)	Cumulative Pore Volume (cm³/g)	Incremental Pore Area (m²/g)	Cumulative Pore Area (m²/g)
1484.3 - 518.4	617.6	0.000217	0.000217	0.014	0.014
518.4 - 239.7	285.5	0.000120	0.000337	0.017	0.031
239.7 - 154.6	178.4	0.000044	0.000382	0.010	0.041
154.6 - 113.7	127.5	0.000022	0.000404	0.007	0.048
113.7 - 90.0	98.8	0.000013	0.000416	0.005	0.053
90.0 - 70.1	77.3	0.000005	0.000422	0.003	0.056
70.1 - 59.9	64.1	0.000002	0.000424	0.001	0.057
59.9 - 18.9	19.9	0.000002	0.000426	0.004	0.061
18.9 - 18.1	18.5	0.000003	0.000429	0.006	0.068
18.1 - 17.2	17.6	0.000003	0.000432	0.007	0.075

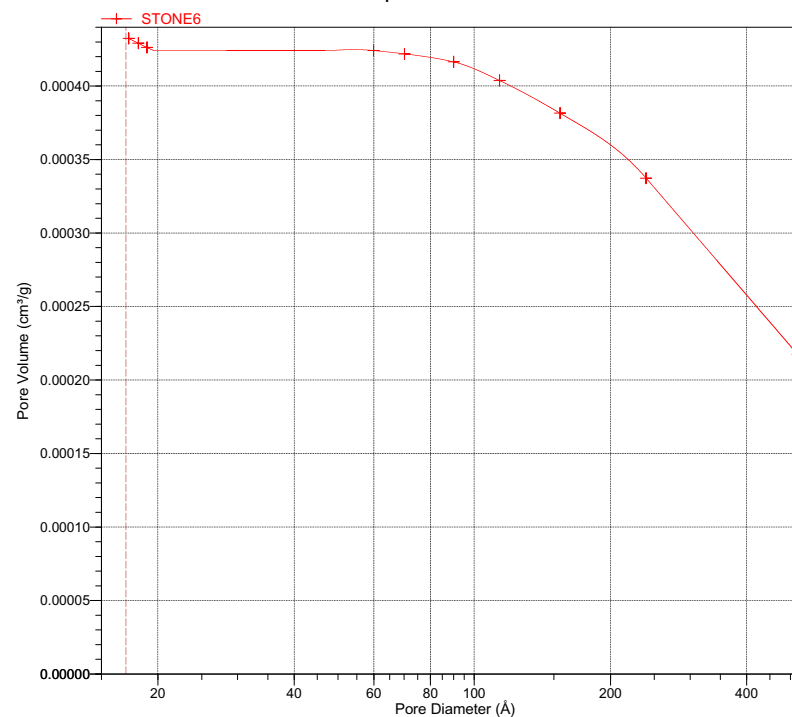


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Sample: STONE6
 Operator:
 Submitter:
 File: D:\DATA\2020\EVA\STONE6.SMP

Started: 2010-08-26 9:13:17 Analysis Adsorptive: N2
 Completed: 2010-08-26 13:13:33 Analysis Bath Temp.: -195.741 °C
 Report Time: 2010-08-30 13:51:20 Thermal Correction: No
 Sample Mass: 13.0402 g Smoothed Pressures: No
 Warm Free Space: 23.1536 cm³ Measured Cold Free Space: 68.7163 cm³
 Equilibration Interval: 10 s Low Pressure Dose: None
 Automatic Degas: Yes

BJH Adsorption Cumulative Pore Volume





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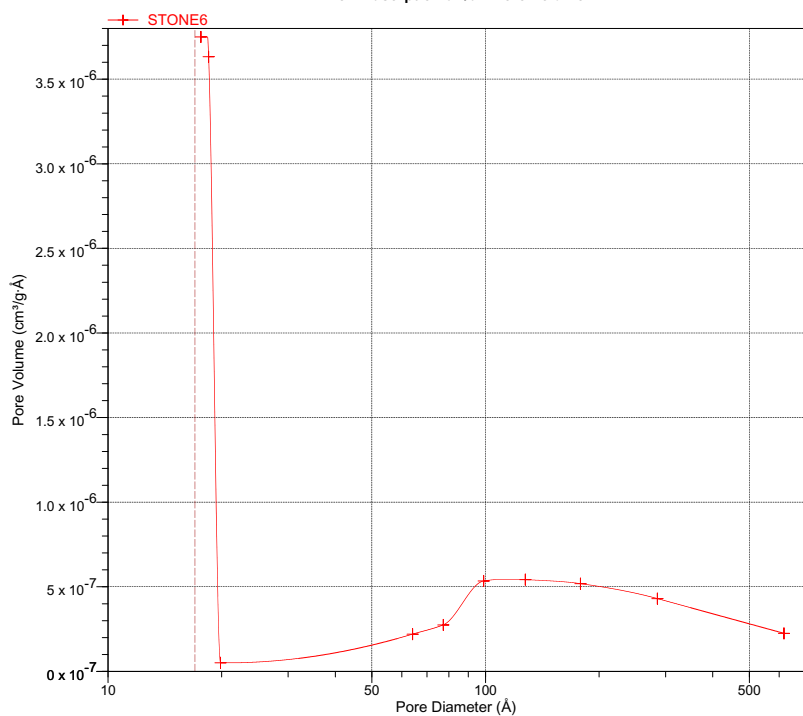
Page 11

Sample: STONE6
 Operator:
 Submitter:
 File: D:\DATA\2020\EVA\STONE6.SMP

Started: 2010-08-26 9:13:17
 Completed: 2010-08-26 13:13:33
 Report Time: 2010-08-30 13:51:20
 Sample Mass: 13.0402 g
 Warm Free Space: 23.1536 cm³ Measured
 Equilibration Interval: 10 s
 Automatic Degas: Yes

Analysis Adsorptive: N2
 Analysis Bath Temp.: -195.741 °C
 Thermal Correction: No
 Smoothed Pressures: No
 Cold Free Space: 68.7163 cm³
 Low Pressure Dose: None

BJH Adsorption dV/dD Pore Volume



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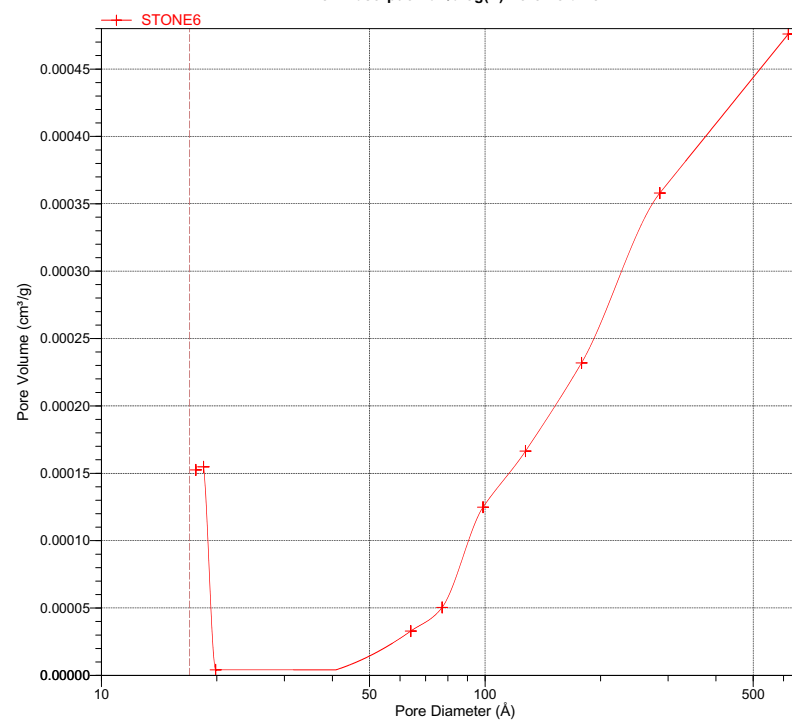
Page 12

Sample: STONE6
 Operator:
 Submitter:
 File: D:\DATA\2020\EVA\STONE6.SMP

Started: 2010-08-26 9:13:17
 Completed: 2010-08-26 13:13:33
 Report Time: 2010-08-30 13:51:20
 Sample Mass: 13.0402 g
 Warm Free Space: 23.1536 cm³ Measured
 Equilibration Interval: 10 s
 Automatic Degas: Yes

Analysis Adsorptive: N2
 Analysis Bath Temp.: -195.741 °C
 Thermal Correction: No
 Smoothed Pressures: No
 Cold Free Space: 68.7163 cm³
 Low Pressure Dose: None

BJH Adsorption dV/dlog(D) Pore Volume





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Sample: STONE6
 Operator:
 Submitter:
 File: D:\DATA\2020\EVA\STONE6.SMP

Started: 2010-08-26 9:13:17 Analysis Adsorptive: N2
 Completed: 2010-08-26 13:13:33 Analysis Bath Temp.: -195.741 °C
 Report Time: 2010-08-30 13:51:20 Thermal Correction: No
 Sample Mass: 13.0402 g Smoothed Pressures: No
 Warm Free Space: 23.1536 cm³ Measured Cold Free Space: 68.7163 cm³
 Equilibration Interval: 10 s Low Pressure Dose: None
 Automatic Degas: Yes

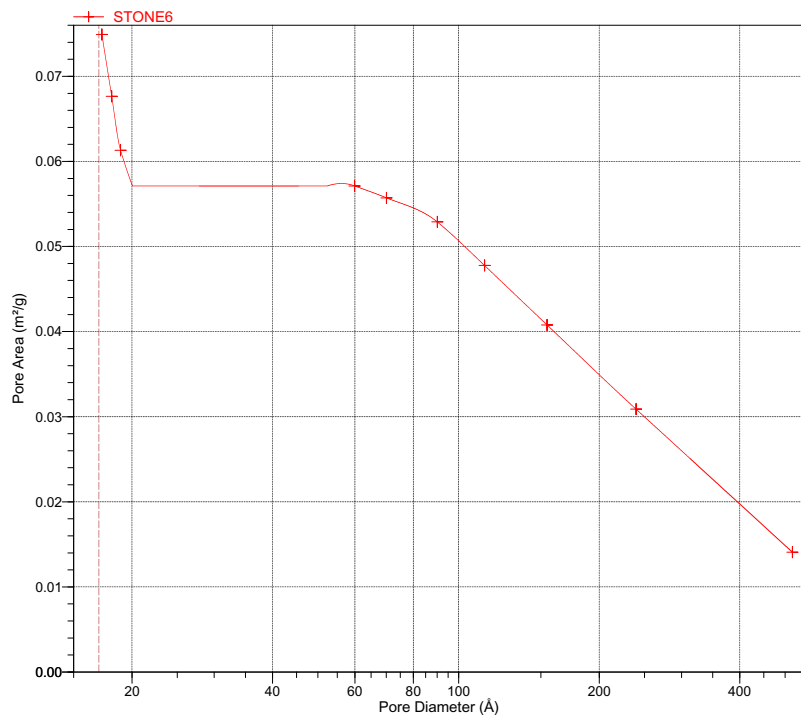


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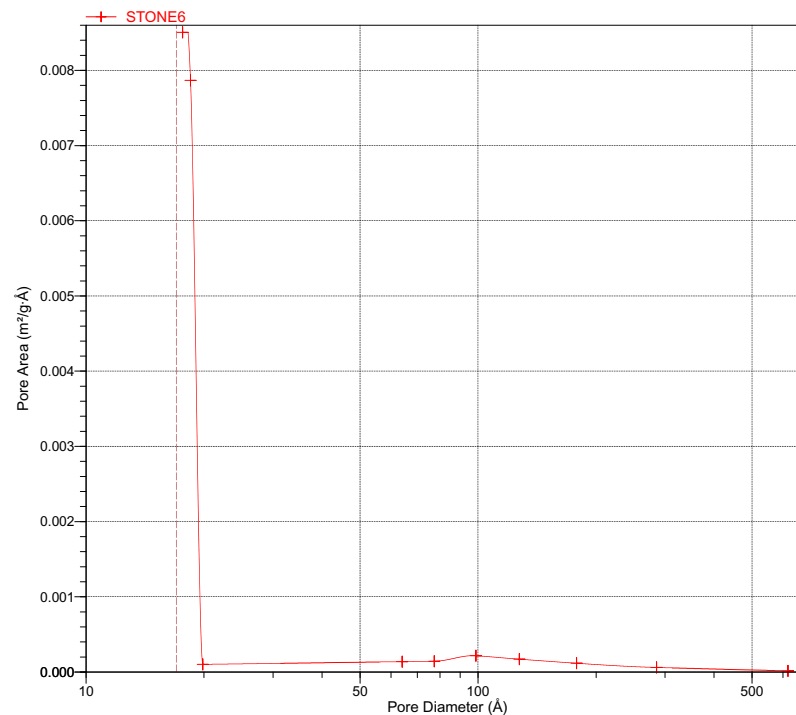
Sample: STONE6
 Operator:
 Submitter:
 File: D:\DATA\2020\EVA\STONE6.SMP

Started: 2010-08-26 9:13:17 Analysis Adsorptive: N2
 Completed: 2010-08-26 13:13:33 Analysis Bath Temp.: -195.741 °C
 Report Time: 2010-08-30 13:51:20 Thermal Correction: No
 Sample Mass: 13.0402 g Smoothed Pressures: No
 Warm Free Space: 23.1536 cm³ Measured Cold Free Space: 68.7163 cm³
 Equilibration Interval: 10 s Low Pressure Dose: None
 Automatic Degas: Yes

BJH Adsorption Cumulative Pore Area



BJH Adsorption dA/dD Pore Area





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Sample: STONE6
 Operator:
 Submitter:
 File: D:\DATA\2020\EVA\STONE6.SMP

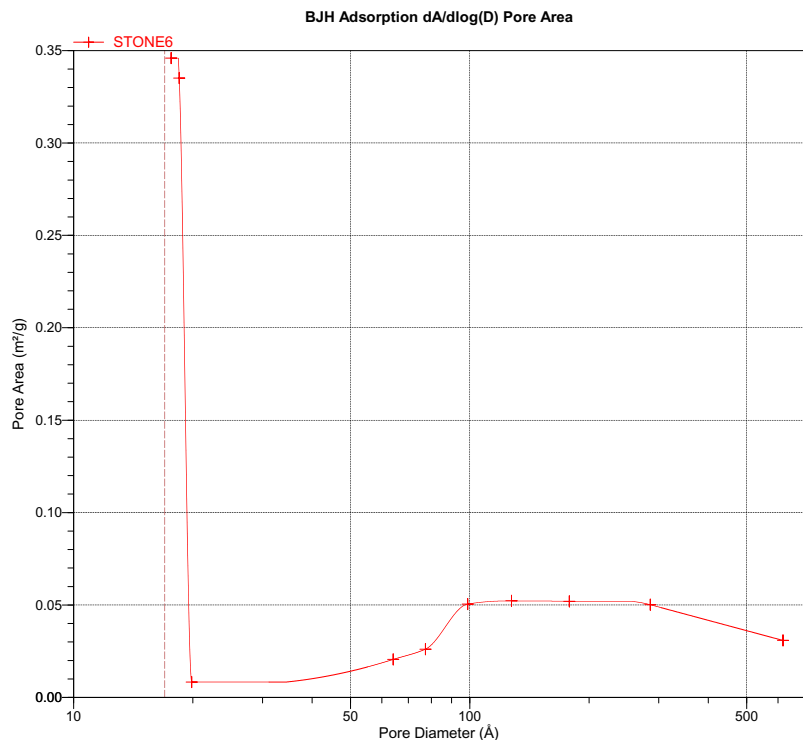
Started: 2010-08-26 9:13:17 Analysis Adsorptive: N2
 Completed: 2010-08-26 13:13:33 Analysis Bath Temp.: -195.741 °C
 Report Time: 2010-08-30 13:51:20 Thermal Correction: No
 Sample Mass: 13.0402 g Smoothed Pressures: No
 Warm Free Space: 23.1536 cm³ Measured Cold Free Space: 68.7163 cm³
 Equilibration Interval: 10 s Low Pressure Dose: None
 Automatic Degas: Yes



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Sample: STONE6
 Operator:
 Submitter:
 File: D:\DATA\2020\EVA\STONE6.SMP

Started: 2010-08-26 9:13:17 Analysis Adsorptive: N2
 Completed: 2010-08-26 13:13:33 Analysis Bath Temp.: -195.741 °C
 Report Time: 2010-08-30 13:51:20 Thermal Correction: No
 Sample Mass: 13.0402 g Smoothed Pressures: No
 Warm Free Space: 23.1536 cm³ Measured Cold Free Space: 68.7163 cm³
 Equilibration Interval: 10 s Low Pressure Dose: None
 Automatic Degas: Yes



Horvath-Kawazoe Report

Slit Pore Geometry (Original H-K)

Maximum Pore Volume: 0.000461 cm³/g
 at Relative Pressure: 0.986796310
 Median Pore Width: 675.742 Å
 Relative Pressure Range: 1.148e-02 to 9.868e-01

Diameter of Adsorptive Molecule: 3.000 Å
 Diameter of Adsorptive at Zero Interaction Energy: 2.574 Å
 Diameter of Sample Atom: 3.040 Å
 Diameter of Sample Atom at Zero Interaction Energy: 2.609 Å
 Interaction Parameter: 3.49e-43 erg·cm⁴

Density Conversion Factor: 0.0015468

Absolute Pressure (mmHg)	Relative Pressure (p/p ⁰)	Quantity Adsorbed (cm ³ /g STP)	Pore Width (Å)	Cumulative Pore Volume (cm ³ /g)	Differential Pore Volume (cm ³ /g·Å)
8.78236	0.011477297	0.0320	10.459	0.0000	0.0000
23.15161	0.030256591	0.0360	12.645	0.0001	0.0000
30.86697	0.040340685	0.0374	13.539	0.0001	0.0000
38.01411	0.049682604	0.0385	14.293	0.0001	0.0000
45.66487	0.059682726	0.0393	15.047	0.0001	0.0000
58.20425	0.076073161	0.0403	16.205	0.0001	0.0000
70.94765	0.092731039	0.0412	17.321	0.0001	0.0000
83.52663	0.109173945	0.0420	18.398	0.0001	0.0000
121.26894	0.158510260	0.0433	21.550	0.0001	0.0000
158.99486	0.207824997	0.0442	24.771	0.0001	0.0000
196.73579	0.257162967	0.0450	28.192	0.0001	0.0000
234.48596	0.306512921	0.0458	31.939	0.0001	0.0000
272.20734	0.355829628	0.0465	36.137	0.0001	0.0000
309.92032	0.405137713	0.0471	40.877	0.0001	0.0000
347.67661	0.454504756	0.0476	46.411	0.0001	0.0000
385.37674	0.503796744	0.0479	52.939	0.0001	0.0000
423.12857	0.553162272	0.0486	60.776	0.0001	0.0000
460.96909	0.602646091	0.0495	70.539	0.0001	0.0000
498.58929	0.651839070	0.0510	83.048	0.0001	0.0000
536.40234	0.701291295	0.0536	99.404	0.0001	0.0000
586.72992	0.767101640	0.0585	132.187	0.0001	0.0000
624.21692	0.816132280	0.0664	171.402	0.0001	0.0000
662.19446	0.865799752	0.0797	241.179	0.0001	0.0000
699.47308	0.914554978	0.1053	387.711	0.0002	0.0000
735.23914	0.961349310	0.1728	856.612	0.0003	0.0000
754.67102	0.986796310	0.2980	2403.986	0.0005	0.0000



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Sample: STONE6
 Operator:
 Submitter:
 File: D:\DATA\2020\EVA\STONE6.SMP

Started: 2010-08-26 9:13:17 Analysis Adsorptive: N2
 Completed: 2010-08-26 13:13:33 Analysis Bath Temp.: -195.741 °C
 Report Time: 2010-08-30 13:51:20 Thermal Correction: No
 Sample Mass: 13.0402 g Smoothed Pressures: No
 Warm Free Space: 23.1536 cm³ Measured Cold Free Space: 68.7163 cm³
 Equilibration Interval: 10 s Low Pressure Dose: None
 Automatic Degas: Yes

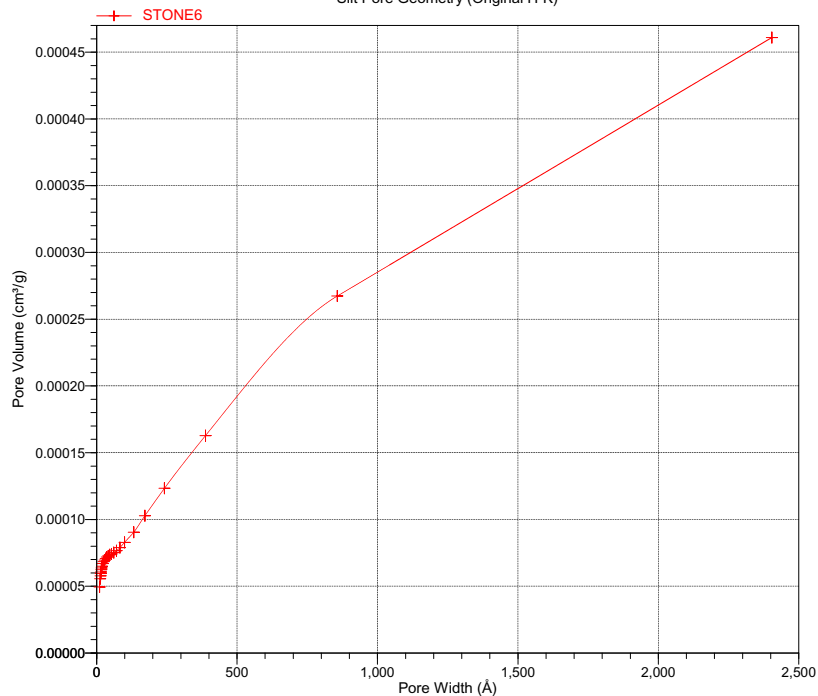


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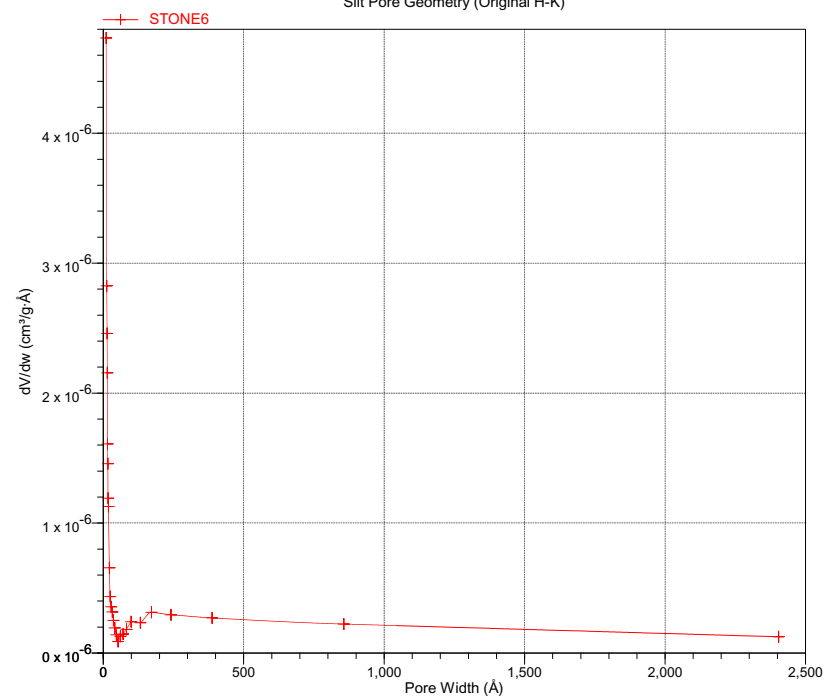
Sample: STONE6
 Operator:
 Submitter:
 File: D:\DATA\2020\EVA\STONE6.SMP

Started: 2010-08-26 9:13:17 Analysis Adsorptive: N2
 Completed: 2010-08-26 13:13:33 Analysis Bath Temp.: -195.741 °C
 Report Time: 2010-08-30 13:51:20 Thermal Correction: No
 Sample Mass: 13.0402 g Smoothed Pressures: No
 Warm Free Space: 23.1536 cm³ Measured Cold Free Space: 68.7163 cm³
 Equilibration Interval: 10 s Low Pressure Dose: None
 Automatic Degas: Yes

Horvath-Kawazoe Cumulative Pore Volume Plot
 Slit Pore Geometry (Original H-K)



Horvath-Kawazoe Differential Pore Volume Plot
 Slit Pore Geometry (Original H-K)





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Unit 1

Serial #: 182

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Sample: STONE6
 Operator:
 Submitter:
 File: D:\DATA\2020\EVA\STONE6.SMP

Started: 2010-08-26 9:13:17	Analysis Adsorptive: N2
Completed: 2010-08-26 13:13:33	Analysis Bath Temp.: -195.741 °C
Report Time: 2010-08-30 13:51:20	Thermal Correction: No
Sample Mass: 13.0402 g	Smoothed Pressures: No
Warm Free Space: 23.1536 cm ³ Measured	Cold Free Space: 68.7163 cm ³
Equilibration Interval: 10 s	Low Pressure Dose: None
Automatic Degas: Yes	

Summary Report

Surface Area

Single point surface area at $p/p^* = 0.306512921$: 0.1382 m²/g

BET Surface Area: 0.1309 m²/g

t-Plot Micropore Area: 0.0790 m²/g

t-Plot External Surface Area: 0.0519 m²/g

BJH Adsorption cumulative surface area of pores
 between 17.000 Å and 3000.000 Å diameter: 0.0749 m²/g

BJH Desorption cumulative surface area of pores
 between 17.000 Å and 3000.000 Å diameter: 0.1842 m²/g

Pore Volume

Single point adsorption total pore volume of pores
 less than 1484.9928 Å at $p/p^* = 0.986796310$: 0.000461 cm³/g

t-Plot micropore volume: 0.000045 cm³/g

BJH Adsorption cumulative volume of pores
 between 17.000 Å and 3000.000 Å diameter: 0.000432 cm³/g

BJH Desorption cumulative volume of pores
 between 17.000 Å and 3000.000 Å diameter: 0.000247 cm³/g

Pore Size

Adsorption average pore width (4V/A by BET): 140.8412 Å

BJH Adsorption average pore diameter (4V/A): 230.819 Å

BJH Desorption average pore diameter (4V/A): 53.710 Å

Horvath-Kawazoe

Maximum pore volume at $p/p^* = 0.986796310$: 0.000461 cm³/g

Median pore width: 675.7419 Å

Dubinin-Radushkevich

Micropore surface area: 0.0000 m²/g

Monolayer capacity: 0.000000 cm³/g



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Unit 1

Serial #: 182

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Sample: STONE6
 Operator:
 Submitter:
 File: D:\DATA\2020\EVA\STONE6.SMP

Started: 2010-08-26 9:13:17	Analysis Adsorptive: N2
Completed: 2010-08-26 13:13:33	Analysis Bath Temp.: -195.741 °C
Report Time: 2010-08-30 13:51:20	Thermal Correction: No
Sample Mass: 13.0402 g	Smoothed Pressures: No
Warm Free Space: 23.1536 cm ³ Measured	Cold Free Space: 68.7163 cm ³
Equilibration Interval: 10 s	Low Pressure Dose: None
Automatic Degas: Yes	

Dubinin-Astakhov

Micropore surface area: 0.1857 m²/g

Limiting micropore volume: 0.000086 cm³/g

MP-Method

Cumulative surface area of pores between
 18.7550 Å and 18.7550 Å hydraulic radius: 0.0000 m²/g

Cumulative pore volume of pores between
 18.7550 Å and 18.7550 Å hydraulic radius: 0.000000 cm³/g

Average pore hydraulic radius (V/A): 0.0000 Å

A2.11 Pore size distributions (PSD) according to the density functional theory (DFT) (as referenced to in Section 3.2.2) for the HV sample size fraction 0.25–0.5 mm

Micromeritics Instrument Corporation
 DFT Plus(R) V3.00 (ASAP 2020 V1.05) Unit 1 Page 1
 Sample: STONE8
 Operator:
 Submitter:
 Source File: D:\DATA\2020\EVA\STONE8.SMP
 Started: 2010-08-27 13:30:49 Analysis Adsorptive: N2
 Completed: 2010-08-27 19:02:17 Analysis Bath: 77.479 K
 Report Time: 2010-12-22 11:56:46 Thermal Correction: No
 Sample Mass: 12.7631 g Equil. Interval: 10 s
 Warm Freespace: 23.3044 cm³ Cold Freespace: 67.3010 cm³

Porosity Distribution by Original Density Functional Theory
 Model: N2 @ 77K on Carbon, Slit Pores
 Method: Non-negative Regularization; No Smoothing

Volume in Pores	<	14.83 Å	:	0.00001 cm ³ /g
Total Volume in Pores	<=	798.65 Å	:	0.00053 cm ³ /g
Area in Pores	>	798.65 Å	:	0.131 m ² /g
Total Area in Pores	>=	14.83 Å	:	0.172 m ² /g

Pore Size Table

Pore Width (Å)	Cumulative Volume (cm ³ /g)	Incremental Volume (cm ³ /g)	Cumulative Area (m ² /g)	Incremental Area (m ² /g)
14.83	0.00000	0.00000	0.002	0.002
15.91	0.00000	0.00000	0.002	0.000
17.16	0.00000	0.00000	0.002	0.000
18.59	0.00000	0.00000	0.002	0.000
20.02	0.00000	0.00000	0.002	0.000
21.62	0.00000	0.00000	0.002	0.000
23.41	0.00000	0.00000	0.002	0.000
25.20	0.00000	0.00000	0.002	0.000
27.34	0.00000	0.00000	0.002	0.000
29.49	0.00000	0.00000	0.002	0.001
31.81	0.00000	0.00000	0.003	0.000
34.31	0.00000	0.00000	0.003	0.000
36.99	0.00000	0.00000	0.003	0.000
40.03	0.00000	0.00000	0.003	0.000
43.25	0.00000	0.00000	0.003	0.000
46.64	0.00000	0.00000	0.003	0.000
50.40	0.00000	0.00000	0.003	0.000
54.33	0.00000	0.00000	0.003	0.000
58.80	0.00000	0.00000	0.003	0.000
63.44	0.00001	0.00000	0.003	0.000
68.45	0.00001	0.00000	0.004	0.000
73.99	0.00001	0.00000	0.005	0.001
79.88	0.00001	0.00000	0.006	0.001
86.32	0.00002	0.00001	0.007	0.001
93.11	0.00003	0.00001	0.009	0.002
100.61	0.00003	0.00001	0.010	0.001
108.66	0.00004	0.00001	0.011	0.001
117.23	0.00005	0.00001	0.012	0.001
126.53	0.00005	0.00001	0.013	0.001
136.71	0.00006	0.00001	0.015	0.001
147.61	0.00007	0.00001	0.016	0.002
159.41	0.00009	0.00001	0.018	0.002
172.10	0.00010	0.00001	0.019	0.001
185.86	0.00011	0.00001	0.020	0.001

Micromeritics Instrument Corporation
 DFT Plus(R) V3.00 (ASAP 2020 V1.05) Unit 1 Page 2
 Sample: STONE8
 Operator:
 Submitter:
 Source File: D:\DATA\2020\EVA\STONE8.SMP
 Started: 2010-08-27 13:30:49 Analysis Adsorptive: N2
 Completed: 2010-08-27 19:02:17 Analysis Bath: 77.479 K
 Report Time: 2010-12-22 11:56:46 Thermal Correction: No
 Sample Mass: 12.7631 g Equil. Interval: 10 s
 Warm Freespace: 23.3044 cm³ Cold Freespace: 67.3010 cm³

Porosity Distribution by Original Density Functional Theory
 Model: N2 @ 77K on Carbon, Slit Pores
 Method: Non-negative Regularization; No Smoothing

Volume in Pores	<	14.83 Å	:	0.00001 cm ³ /g
Total Volume in Pores	<=	798.65 Å	:	0.00053 cm ³ /g
Area in Pores	>	798.65 Å	:	0.131 m ² /g
Total Area in Pores	>=	14.83 Å	:	0.172 m ² /g

Pore Size Table

Pore Width (Å)	Cumulative Volume (cm ³ /g)	Incremental Volume (cm ³ /g)	Cumulative Area (m ² /g)	Incremental Area (m ² /g)
200.69	0.00011	0.00000	0.020	0.000
216.60	0.00011	0.00000	0.020	0.000
233.93	0.00011	0.00000	0.020	0.000
252.52	0.00012	0.00001	0.021	0.001
272.71	0.00014	0.00002	0.023	0.002
294.51	0.00017	0.00002	0.024	0.002
317.92	0.00020	0.00003	0.026	0.002
343.30	0.00024	0.00004	0.029	0.003
370.64	0.00029	0.00005	0.031	0.003
400.31	0.00033	0.00004	0.033	0.002
432.30	0.00036	0.00003	0.035	0.001
466.79	0.00038	0.00003	0.036	0.001
503.96	0.00041	0.00003	0.037	0.001
544.17	0.00044	0.00003	0.038	0.001
587.60	0.00046	0.00002	0.039	0.001
634.42	0.00047	0.00002	0.039	0.000
684.99	0.00049	0.00002	0.040	0.001
739.68	0.00051	0.00001	0.040	0.000
798.65	0.00052	0.00001	0.040	0.000

Micromeritics Instrument Corporation

DFT Plus(R) V3.00 (ASAP 2020 V1.05)

Unit 1

Page 3

Sample: STONE8
 Operator:
 Submitter:
 Source File: D:\DATA\2020\EVA\STONE8.SMP

Started: 2010-08-27 13:30:49 Analysis Adsorptive: N2
 Completed: 2010-08-27 19:02:17 Analysis Bath: 77.479 K
 Report Time: 2010-12-22 11:56:46 Thermal Correction: No
 Sample Mass: 12.7631 g Equil. Interval: 10 s
 Warm Freespace: 23.3044 cm³ Cold Freespace: 67.3010 cm³

Porosity Distribution by Original Density Functional Theory
 Model: N2 @ 77K on Carbon, Slit Pores
 Method: Non-negative Regularization; No Smoothing

Standard Deviation of Fit: 0.00223, cm³/g

Isotherm Table

Relative Pressure	Experimental Quantity Adsorbed (cm ³ /g STP)	Fitted Quantity Adsorbed (cm ³ /g STP)	Absolute Residual (cm ³ /g STP)	Relative Residual
0.011783670	0.0456	0.0465	-0.0009	-0.019237
0.014515520	0.0468	0.0473	-0.0005	-0.010791
0.017706521	0.0482	0.0485	-0.0003	-0.006433
0.021398440	0.0498	0.0495	0.0003	0.005966
0.025631230	0.0514	0.0505	0.0009	0.018130
0.030442240	0.0530	0.0515	0.0015	0.027778
0.035865448	0.0545	0.0527	0.0019	0.034386
0.041930798	0.0560	0.0539	0.0021	0.037207
0.048663601	0.0576	0.0554	0.0022	0.037700
0.056084011	0.0591	0.0570	0.0021	0.035816
0.064206667	0.0608	0.0589	0.0019	0.030793
0.073040441	0.0624	0.0610	0.0014	0.022389
0.082588248	0.0640	0.0632	0.0007	0.011267
0.092847057	0.0656	0.0656	0.0000	-0.000141
0.103808001	0.0673	0.0680	-0.0007	-0.009959
0.115456402	0.0690	0.0702	-0.0012	-0.018107
0.127772301	0.0707	0.0723	-0.0017	-0.023600
0.140730694	0.0724	0.0743	-0.0019	-0.026514
0.154301897	0.0741	0.0761	-0.0020	-0.027387
0.168452203	0.0759	0.0779	-0.0020	-0.026567
0.183144197	0.0777	0.0796	-0.0019	-0.024022
0.198337302	0.0796	0.0812	-0.0016	-0.020289
0.213988706	0.0815	0.0828	-0.0013	-0.015856
0.230053306	0.0834	0.0843	-0.0009	-0.010882
0.246484801	0.0854	0.0859	-0.0005	-0.005760
0.263235897	0.0874	0.0874	-0.0001	-0.000910
0.280259013	0.0894	0.0894	0.0000	0.000004
0.297506303	0.0914	0.0910	0.0004	0.003850
0.314930797	0.0934	0.0929	0.0005	0.005248
0.332486212	0.0955	0.0948	0.0007	0.007234
0.350127310	0.0975	0.0967	0.0008	0.008192
0.367810607	0.0995	0.0987	0.0008	0.008107
0.385494202	0.1016	0.1009	0.0007	0.007078
0.403138310	0.1036	0.1031	0.0006	0.005322
0.420704991	0.1057	0.1053	0.0003	0.003072
0.438158900	0.1077	0.1076	0.0001	0.000667
0.455466807	0.1096	0.1098	-0.0002	-0.001436

Micromeritics Instrument Corporation

DFT Plus(R) V3.00 (ASAP 2020 V1.05)

Unit 1

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Sample: STONE8
 Operator:
 Submitter:
 Source File: D:\DATA\2020\EVA\STONE8.SMP

Started: 2010-08-27 13:30:49 Analysis Adsorptive: N2
 Completed: 2010-08-27 19:02:17 Analysis Bath: 77.479 K
 Report Time: 2010-12-22 11:56:46 Thermal Correction: No
 Sample Mass: 12.7631 g Equil. Interval: 10 s
 Warm Freespace: 23.3044 cm³ Cold Freespace: 67.3010 cm³

Porosity Distribution by Original Density Functional Theory
 Model: N2 @ 77K on Carbon, Slit Pores
 Method: Non-negative Regularization; No Smoothing

Standard Deviation of Fit: 0.00223, cm³/g

Isotherm Table

Relative Pressure	Experimental Quantity Adsorbed (cm ³ /g STP)	Fitted Quantity Adsorbed (cm ³ /g STP)	Absolute Residual (cm ³ /g STP)	Relative Residual
0.472598106	0.1116	0.1119	-0.0003	-0.003031
0.489524394	0.1135	0.1140	-0.0005	-0.004152
0.506219923	0.1155	0.1160	-0.0006	-0.004889
0.522661209	0.1174	0.1180	-0.0006	-0.004866
0.538827300	0.1194	0.1199	-0.0005	-0.004224
0.554699600	0.1214	0.1218	-0.0004	-0.003433
0.570261598	0.1234	0.1237	-0.0003	-0.002222
0.585499227	0.1255	0.1256	-0.0001	-0.000682
0.600400090	0.1276	0.1276	0.0001	0.000677
0.614954293	0.1298	0.1299	-0.0001	-0.000948
0.629153311	0.1320	0.1319	0.0001	0.000473
0.642990828	0.1342	0.1340	0.0002	0.001524
0.656461716	0.1365	0.1365	0.0000	-0.000003
0.669562697	0.1389	0.1387	0.0001	0.000855
0.682291925	0.1413	0.1414	-0.0001	-0.000798
0.694648683	0.1438	0.1438	0.0000	0.000260
0.706633508	0.1463	0.1461	0.0002	0.001235
0.718248010	0.1490	0.1492	-0.0002	-0.001351
0.729494929	0.1517	0.1514	0.0003	0.001945
0.740377605	0.1546	0.1549	-0.0003	-0.002018
0.750900388	0.1575	0.1571	0.0004	0.002497
0.761068285	0.1603	0.1607	-0.0004	-0.002220
0.770887017	0.1632	0.1628	0.0004	0.002622
0.780362606	0.1664	0.1677	-0.0013	-0.008075
0.789501607	0.1698	0.1698	0.0000	-0.000016
0.798311174	0.1733	0.1719	0.0014	0.008187
0.806798697	0.1769	0.1775	-0.0006	-0.003407
0.814971626	0.1803	0.1796	0.0007	0.003651
0.822837889	0.1838	0.1846	-0.0008	-0.004167
0.830405474	0.1877	0.1869	0.0008	0.004345
0.837682605	0.1918	0.1926	-0.0008	-0.004430
0.844677329	0.1959	0.1950	0.0009	0.004560
0.851397991	0.2000	0.2008	-0.0008	-0.003899
0.857852995	0.2040	0.2032	0.0008	0.004012
0.864050388	0.2078	0.2087	-0.0008	-0.003934
0.869998574	0.2118	0.2110	0.0009	0.004023
0.875705481	0.2165	0.2179	-0.0014	-0.006517

Micromeritics Instrument Corporation

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Sample: STONE8
 Operator:
 Submitter:
 Source File: D:\DATA\2020\EVA\STONE8.SMP

Started: 2010-08-27 13:30:49 Analysis Adsorptive: N2
 Completed: 2010-08-27 19:02:17 Analysis Bath: 77.479 K
 Report Time: 2010-12-22 11:56:46 Thermal Correction: No
 Sample Mass: 12.7631 g Equil. Interval: 10 s
 Warm Freespace: 23.3044 cm³ Cold Freespace: 67.3010 cm³

Porosity Distribution by Original Density Functional Theory
 Model: N2 @ 77K on Carbon, Slit Pores
 Method: Non-negative Regularization; No Smoothing

Standard Deviation of Fit: 0.00223, cm³/g

Isotherm Table

Relative Pressure	Experimental Quantity Adsorbed (cm ³ /g STP)	Fitted Quantity Adsorbed (cm ³ /g STP)	Absolute Residual (cm ³ /g STP)	Relative Residual
0.881179392	0.2215	0.2201	0.0014	0.006513
0.886428118	0.2268	0.2284	-0.0016	-0.007138
0.891459525	0.2322	0.2306	0.0016	0.007096
0.896281302	0.2377	0.2392	-0.0015	-0.006511
0.900900900	0.2429	0.2414	0.0016	0.006474
0.905325770	0.2481	0.2493	-0.0013	-0.005191
0.909563184	0.2529	0.2516	0.0013	0.005178
0.913620114	0.2575	0.2576	-0.0001	-0.000281
0.917503417	0.2609	0.2600	0.0009	0.003407
0.921219707	0.2631	0.2625	0.0006	0.002354
0.924775481	0.2649	0.2650	-0.0001	-0.000383
0.928177178	0.2668	0.2675	-0.0007	-0.002531
0.931430817	0.2693	0.2699	-0.0006	-0.002314
0.934542298	0.2727	0.2738	-0.0011	-0.004001
0.937517405	0.2773	0.2762	0.0011	0.003990
0.940361619	0.2832	0.2856	-0.0025	-0.008662
0.943080306	0.2904	0.2879	0.0025	0.008502
0.945678592	0.2990	0.3029	-0.0038	-0.012864
0.948161721	0.3090	0.3052	0.0039	0.012500
0.950534225	0.3204	0.3204	0.0000	0.000027
0.952800930	0.3331	0.3388	-0.0057	-0.017085
0.954966187	0.3470	0.3413	0.0057	0.016449
0.957034409	0.3620	0.3687	-0.0067	-0.018503
0.959009588	0.3780	0.3713	0.0067	0.017762
0.960896015	0.3940	0.4003	-0.0063	-0.016044
0.962697208	0.4092	0.4029	0.0063	0.015481
0.964416981	0.4238	0.4295	-0.0057	-0.013492
0.966058910	0.4377	0.4320	0.0057	0.013088
0.967626274	0.4510	0.4510	0.0000	0.000006
0.969122529	0.4636	0.4685	-0.0049	-0.010476
0.970550597	0.4757	0.4708	0.0049	0.010226
0.971913695	0.4872	0.4915	-0.0043	-0.008753
0.973214507	0.4983	0.4940	0.0043	0.008572
0.974455774	0.5088	0.5124	-0.0037	-0.007204
0.975640416	0.5188	0.5151	0.0037	0.007074
0.976770699	0.5283	0.5283	0.0000	0.000001
0.977849126	0.5375	0.5404	-0.0030	-0.005512

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DFT Plus(R) V3.00 (ASAP 2020 V1.05) Unit 1 Page 6

Sample: STONE8
 Operator:
 Submitter:
 Source File: D:\DATA\2020\EVA\STONE8.SMP

Started: 2010-08-27 13:30:49 Analysis Adsorptive: N2
 Completed: 2010-08-27 19:02:17 Analysis Bath: 77.479 K
 Report Time: 2010-12-22 11:56:46 Thermal Correction: No
 Sample Mass: 12.7631 g Equil. Interval: 10 s
 Warm Freespace: 23.3044 cm³ Cold Freespace: 67.3010 cm³

Porosity Distribution by Original Density Functional Theory
 Model: N2 @ 77K on Carbon, Slit Pores
 Method: Non-negative Regularization; No Smoothing

Standard Deviation of Fit: 0.00223, cm³/g

Isotherm Table

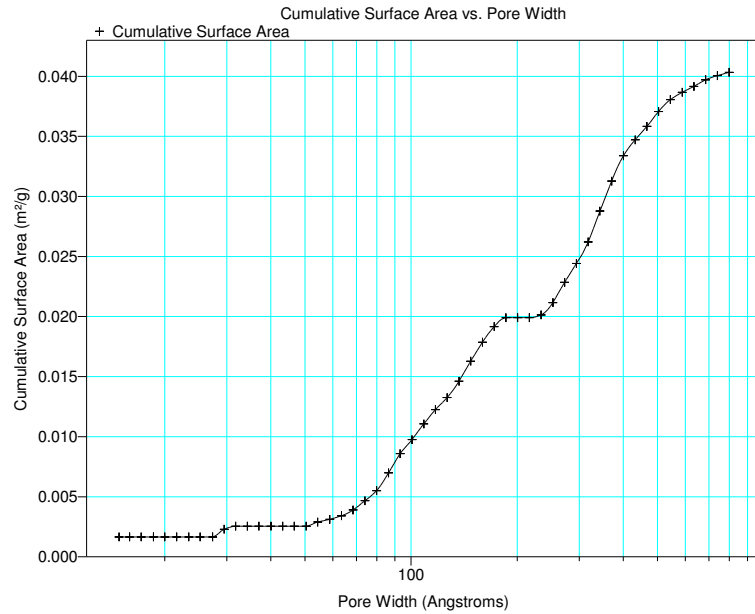
Relative Pressure	Experimental Quantity Adsorbed (cm ³ /g STP)	Fitted Quantity Adsorbed (cm ³ /g STP)	Absolute Residual (cm ³ /g STP)	Relative Residual
0.978878021	0.5462	0.5432	0.0030	0.005430
0.979859591	0.5545	0.5571	-0.0026	-0.004752
0.980795979	0.5624	0.5598	0.0026	0.004689
0.981689274	0.5700	0.5700	0.0000	0.000000
0.982541502	0.5772	0.5793	-0.0021	-0.003644
0.983354270	0.5841	0.5820	0.0021	0.003604

Sample: STONE8
 Operator:
 Submitter:
 Source File: D:\DATA\2020\EVA\STONE8.SMP

Started: 2010-08-27 13:30:49 Analysis Adsorptive: N2
 Completed: 2010-08-27 19:02:17 Analysis Bath: 77.479 K
 Report Time: 2010-12-22 11:56:46 Thermal Correction: No
 Sample Mass: 12.7631 g Equil. Interval: 10 s
 Warm Freespace: 23.3044 cm³ Cold Freespace: 67.3010 cm³

Porosity Distribution by Original Density Functional Theory
 Model: N2 @ 77K on Carbon, Slit Pores
 Method: Non-negative Regularization; No Smoothing

Volume in Pores <	14.83 Å	:	0.00001 cm ³ /g
Total Volume in Pores <=	798.65 Å	:	0.00053 cm ³ /g
Area in Pores >	798.65 Å	:	0.131 m ² /g
Total Area in Pores >=	14.83 Å	:	0.172 m ² /g

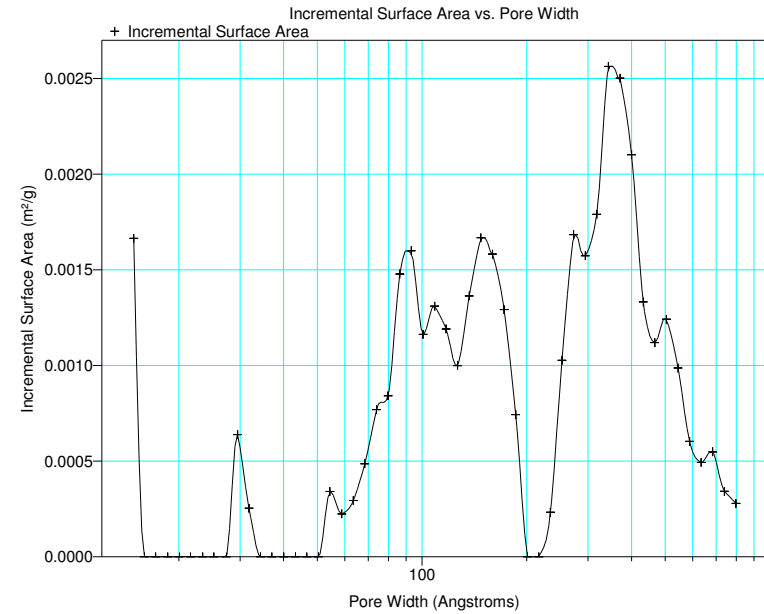


Sample: STONE8
 Operator:
 Submitter:
 Source File: D:\DATA\2020\EVA\STONE8.SMP

Started: 2010-08-27 13:30:49 Analysis Adsorptive: N2
 Completed: 2010-08-27 19:02:17 Analysis Bath: 77.479 K
 Report Time: 2010-12-22 11:56:46 Thermal Correction: No
 Sample Mass: 12.7631 g Equil. Interval: 10 s
 Warm Freespace: 23.3044 cm³ Cold Freespace: 67.3010 cm³

Porosity Distribution by Original Density Functional Theory
 Model: N2 @ 77K on Carbon, Slit Pores
 Method: Non-negative Regularization; No Smoothing

Volume in Pores <	14.83 Å	:	0.00001 cm ³ /g
Total Volume in Pores <=	798.65 Å	:	0.00053 cm ³ /g
Area in Pores >	798.65 Å	:	0.131 m ² /g
Total Area in Pores >=	14.83 Å	:	0.172 m ² /g



Micromeritics Instrument Corporation

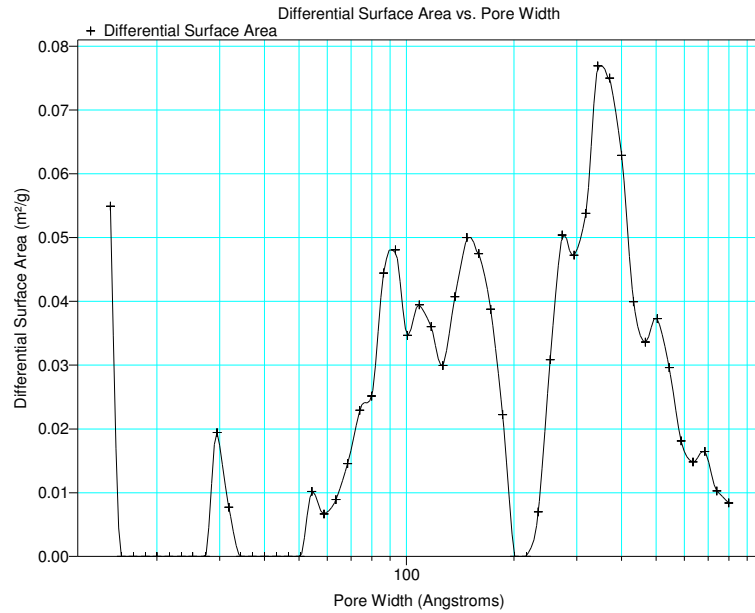
DFT Plus(R) V3.00 (ASAP 2020 V1.05) Unit 1 Page 9

Sample: STONE8
 Operator:
 Submitter:
 Source File: D:\DATA\2020\EVA\STONE8.SMP

Started: 2010-08-27 13:30:49 Analysis Adsorptive: N2
 Completed: 2010-08-27 19:02:17 Analysis Bath: 77.479 K
 Report Time: 2010-12-22 11:56:46 Thermal Correction: No
 Sample Mass: 12.7631 g Equil. Interval: 10 s
 Warm Freespace: 23.3044 cm³ Cold Freespace: 67.3010 cm³

Porosity Distribution by Original Density Functional Theory
 Model: N2 @ 77K on Carbon, Slit Pores
 Method: Non-negative Regularization; No Smoothing

Volume in Pores <	14.83 Å	:	0.00001 cm ³ /g
Total Volume in Pores <=	798.65 Å	:	0.00053 cm ³ /g
Area in Pores >	798.65 Å	:	0.131 m ² /g
Total Area in Pores >=	14.83 Å	:	0.172 m ² /g



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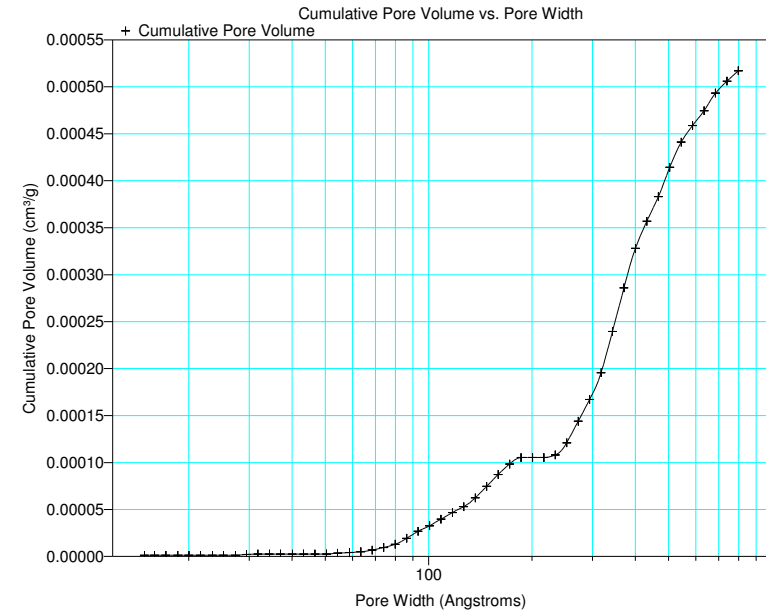
DFT Plus(R) V3.00 (ASAP 2020 V1.05) Unit 1 Page10

Sample: STONE8
 Operator:
 Submitter:
 Source File: D:\DATA\2020\EVA\STONE8.SMP

Started: 2010-08-27 13:30:49 Analysis Adsorptive: N2
 Completed: 2010-08-27 19:02:17 Analysis Bath: 77.479 K
 Report Time: 2010-12-22 11:56:46 Thermal Correction: No
 Sample Mass: 12.7631 g Equil. Interval: 10 s
 Warm Freespace: 23.3044 cm³ Cold Freespace: 67.3010 cm³

Porosity Distribution by Original Density Functional Theory
 Model: N2 @ 77K on Carbon, Slit Pores
 Method: Non-negative Regularization; No Smoothing

Volume in Pores <	14.83 Å	:	0.00001 cm ³ /g
Total Volume in Pores <=	798.65 Å	:	0.00053 cm ³ /g
Area in Pores >	798.65 Å	:	0.131 m ² /g
Total Area in Pores >=	14.83 Å	:	0.172 m ² /g



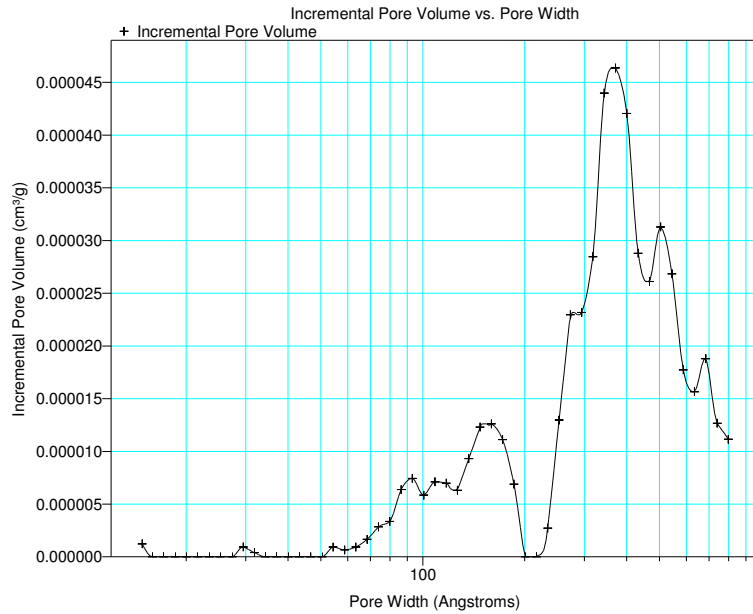
Micromeritics Instrument Corporation

DFT Plus(R) V3.00 (ASAP 2020 V1.05) Unit 1 Page11

Sample: STONE8
 Operator:
 Submitter:
 Source File: D:\DATA\2020\EVA\STONE8.SMP
 Started: 2010-08-27 13:30:49 Analysis Adsorptive: N2
 Completed: 2010-08-27 19:02:17 Analysis Bath: 77.479 K
 Report Time: 2010-12-22 11:56:46 Thermal Correction: No
 Sample Mass: 12.7631 g Equil. Interval: 10 s
 Warm Freespace: 23.3044 cm³ Cold Freespace: 67.3010 cm³

Porosity Distribution by Original Density Functional Theory
 Model: N2 @ 77K on Carbon, Slit Pores
 Method: Non-negative Regularization; No Smoothing

Volume in Pores <	14.83 Å	:	0.00001 cm ³ /g
Total Volume in Pores <=	798.65 Å	:	0.00053 cm ³ /g
Area in Pores >	798.65 Å	:	0.131 m ² /g
Total Area in Pores >=	14.83 Å	:	0.172 m ² /g



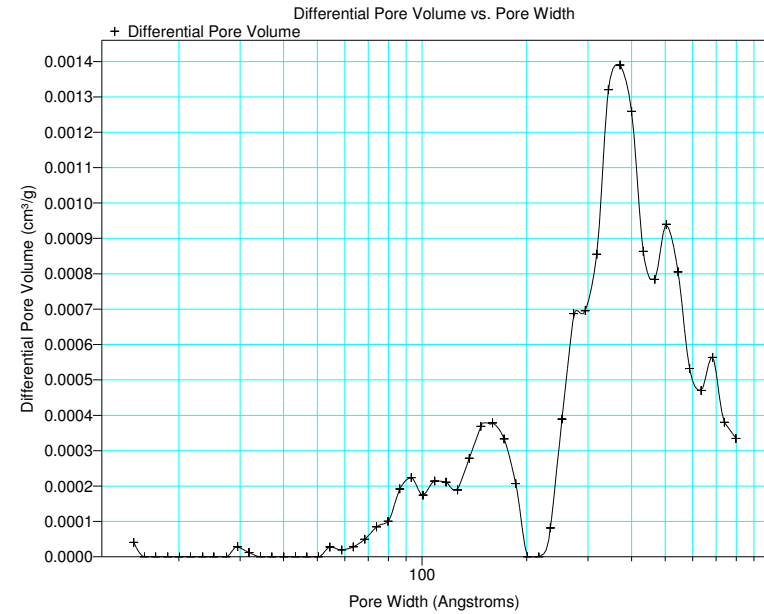
Micromeritics Instrument Corporation

DFT Plus(R) V3.00 (ASAP 2020 V1.05) Unit 1 Page12

Sample: STONE8
 Operator:
 Submitter:
 Source File: D:\DATA\2020\EVA\STONE8.SMP
 Started: 2010-08-27 13:30:49 Analysis Adsorptive: N2
 Completed: 2010-08-27 19:02:17 Analysis Bath: 77.479 K
 Report Time: 2010-12-22 11:56:46 Thermal Correction: No
 Sample Mass: 12.7631 g Equil. Interval: 10 s
 Warm Freespace: 23.3044 cm³ Cold Freespace: 67.3010 cm³

Porosity Distribution by Original Density Functional Theory
 Model: N2 @ 77K on Carbon, Slit Pores
 Method: Non-negative Regularization; No Smoothing

Volume in Pores <	14.83 Å	:	0.00001 cm ³ /g
Total Volume in Pores <=	798.65 Å	:	0.00053 cm ³ /g
Area in Pores >	798.65 Å	:	0.131 m ² /g
Total Area in Pores >=	14.83 Å	:	0.172 m ² /g



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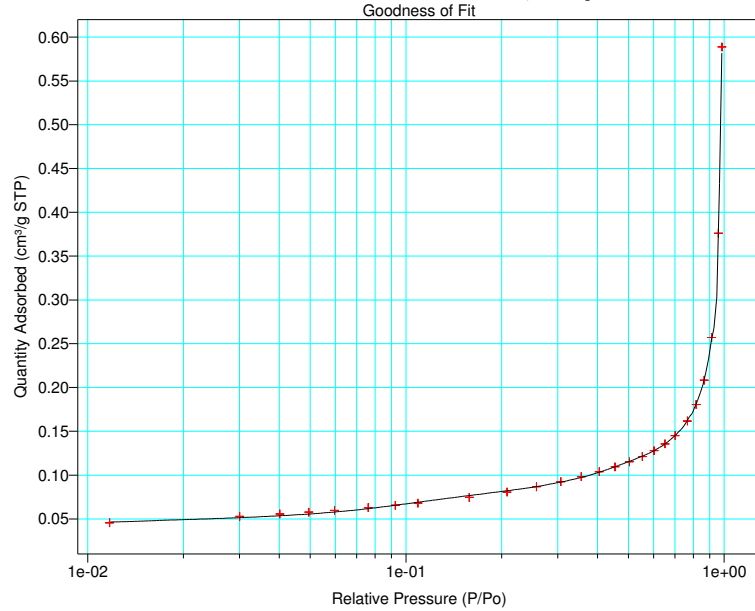
DFT Plus(R) V3.00 (ASAP 2020 V1.05) Unit 1 Page13

Sample: STONE8
 Operator:
 Submitter:
 Source File: D:\DATA\2020\EVA\STONE8.SMP

Started: 2010-08-27 13:30:49 Analysis Adsorptive: N2
 Completed: 2010-08-27 19:02:17 Analysis Bath: 77.479 K
 Report Time: 2010-12-22 11:56:46 Thermal Correction: No
 Sample Mass: 12.7631 g Equil. Interval: 10 s
 Warm Freespace: 23.3044 cm³ Cold Freespace: 67.3010 cm³

Porosity Distribution by Original Density Functional Theory
 Model: N2 @ 77K on Carbon, Slit Pores
 Method: Non-negative Regularization; No Smoothing

Standard Deviation of Fit: 0.00223, cm³/g



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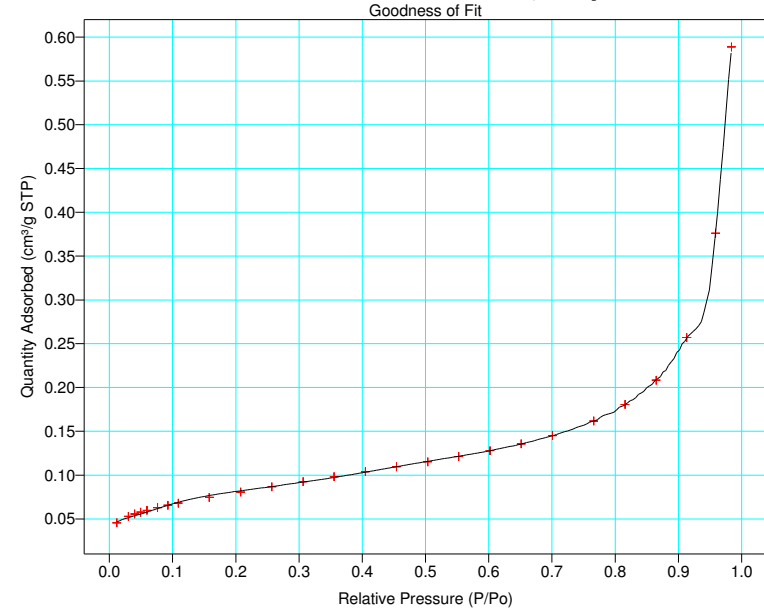
DFT Plus(R) V3.00 (ASAP 2020 V1.05) Unit 1 Page14

Sample: STONE8
 Operator:
 Submitter:
 Source File: D:\DATA\2020\EVA\STONE8.SMP

Started: 2010-08-27 13:30:49 Analysis Adsorptive: N2
 Completed: 2010-08-27 19:02:17 Analysis Bath: 77.479 K
 Report Time: 2010-12-22 11:56:46 Thermal Correction: No
 Sample Mass: 12.7631 g Equil. Interval: 10 s
 Warm Freespace: 23.3044 cm³ Cold Freespace: 67.3010 cm³

Porosity Distribution by Original Density Functional Theory
 Model: N2 @ 77K on Carbon, Slit Pores
 Method: Non-negative Regularization; No Smoothing

Standard Deviation of Fit: 0.00223, cm³/g



A2.12 Pore size distributions (PSD) according to the density functional theory (DFT) (as referenced to in Section 3.2.2) for the HV sample size fraction 0.5–1 mm

Micromeritics Instrument Corporation
 DFT Plus(R) V3.00 (ASAP 2020 V1.05) Unit 1 Page 1

Sample: STONE3
 Operator:
 Submitter:
 Source File: D:\DATA\2020\EVA\STONE3.SMP
 Started: 2010-08-18 9:26:17 Analysis Adsorptive: N2
 Completed: 2010-08-18 14:45:14 Analysis Bath: 77.395 K
 Report Time: 2010-12-22 11:55:20 Thermal Correction: No
 Sample Mass: 13.6461 g Equil. Interval: 10 s
 Warm Freespace: 22.4610 cm³ Cold Freespace: 65.3565 cm³

Porosity Distribution by Original Density Functional Theory
 Model: N2 @ 77K on Carbon, Slit Pores
 Method: Non-negative Regularization; No Smoothing

Volume in Pores < 14.83 Å : 0.00002 cm³/g
 Total Volume in Pores <= 931.26 Å : 0.00050 cm³/g
 Area in Pores > 931.26 Å : 0.094 m²/g
 Total Area in Pores >= 14.83 Å : 0.131 m²/g

Pore Size Table

Pore Width (Å)	Cumulative Volume (cm ³ /g)	Incremental Volume (cm ³ /g)	Cumulative Area (m ² /g)	Incremental Area (m ² /g)
14.83	0.00000	0.00000	0.000	0.000
15.91	0.00000	0.00000	0.000	0.000
17.16	0.00000	0.00000	0.000	0.000
18.59	0.00000	0.00000	0.000	0.000
20.02	0.00000	0.00000	0.000	0.000
21.62	0.00000	0.00000	0.000	0.000
23.41	0.00000	0.00000	0.000	0.000
25.20	0.00000	0.00000	0.000	0.000
27.34	0.00000	0.00000	0.000	0.000
29.49	0.00000	0.00000	0.000	0.000
31.81	0.00000	0.00000	0.000	0.000
34.31	0.00000	0.00000	0.000	0.000
36.99	0.00000	0.00000	0.000	0.000
40.03	0.00000	0.00000	0.000	0.000
43.25	0.00000	0.00000	0.000	0.000
46.64	0.00000	0.00000	0.001	0.000
50.40	0.00000	0.00000	0.001	0.000
54.33	0.00000	0.00000	0.001	0.000
58.80	0.00000	0.00000	0.002	0.000
63.44	0.00001	0.00000	0.002	0.001
68.45	0.00001	0.00000	0.003	0.001
73.99	0.00001	0.00000	0.004	0.001
79.88	0.00002	0.00000	0.005	0.001
86.32	0.00002	0.00001	0.006	0.001
93.11	0.00003	0.00001	0.008	0.002
100.61	0.00004	0.00001	0.009	0.001
108.66	0.00004	0.00001	0.010	0.001
117.23	0.00005	0.00001	0.012	0.001
126.53	0.00006	0.00001	0.013	0.001
136.71	0.00006	0.00001	0.014	0.001
147.61	0.00008	0.00001	0.015	0.002
159.41	0.00009	0.00001	0.017	0.001
172.10	0.00010	0.00001	0.018	0.001
185.86	0.00011	0.00001	0.019	0.001

Micromeritics Instrument Corporation
 DFT Plus(R) V3.00 (ASAP 2020 V1.05) Unit 1 Page 2

Sample: STONE3
 Operator:
 Submitter:
 Source File: D:\DATA\2020\EVA\STONE3.SMP
 Started: 2010-08-18 9:26:17 Analysis Adsorptive: N2
 Completed: 2010-08-18 14:45:14 Analysis Bath: 77.395 K
 Report Time: 2010-12-22 11:55:20 Thermal Correction: No
 Sample Mass: 13.6461 g Equil. Interval: 10 s
 Warm Freespace: 22.4610 cm³ Cold Freespace: 65.3565 cm³

Porosity Distribution by Original Density Functional Theory
 Model: N2 @ 77K on Carbon, Slit Pores
 Method: Non-negative Regularization; No Smoothing

Volume in Pores < 14.83 Å : 0.00002 cm³/g
 Total Volume in Pores <= 931.26 Å : 0.00050 cm³/g
 Area in Pores > 931.26 Å : 0.094 m²/g
 Total Area in Pores >= 14.83 Å : 0.131 m²/g

Pore Size Table

Pore Width (Å)	Cumulative Volume (cm ³ /g)	Incremental Volume (cm ³ /g)	Cumulative Area (m ² /g)	Incremental Area (m ² /g)
200.69	0.00011	0.00000	0.019	0.000
216.60	0.00011	0.00000	0.019	0.000
233.93	0.00011	0.00000	0.020	0.000
252.52	0.00012	0.00001	0.020	0.001
272.71	0.00014	0.00002	0.022	0.001
294.51	0.00016	0.00002	0.023	0.001
317.92	0.00018	0.00002	0.024	0.001
343.30	0.00022	0.00004	0.026	0.002
370.64	0.00026	0.00004	0.028	0.002
400.31	0.00029	0.00004	0.030	0.002
432.30	0.00032	0.00003	0.031	0.001
466.79	0.00034	0.00002	0.032	0.001
503.96	0.00037	0.00003	0.034	0.001
544.17	0.00039	0.00002	0.034	0.001
587.60	0.00041	0.00002	0.035	0.001
634.42	0.00042	0.00001	0.035	0.000
684.99	0.00044	0.00002	0.036	0.001
739.68	0.00045	0.00001	0.036	0.000
798.65	0.00046	0.00001	0.037	0.000
862.45	0.00047	0.00001	0.037	0.000
931.26	0.00048	0.00001	0.037	0.000

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DFT Plus(R) V3.00 (ASAP 2020 V1.05) Unit 1 Page 3

Sample: STONE3
 Operator:
 Submitter:
 Source File: D:\DATA\2020\EVA\STONE3.SMP

Started: 2010-08-18 9:26:17 Analysis Adsorptive: N2
 Completed: 2010-08-18 14:45:14 Analysis Bath: 77.395 K
 Report Time: 2010-12-22 11:55:20 Thermal Correction: No
 Sample Mass: 13.6461 g Equil. Interval: 10 s
 Warm Freespace: 22.4610 cm³ Cold Freespace: 65.3565 cm³

Porosity Distribution by Original Density Functional Theory
 Model: N2 @ 77K on Carbon, Slit Pores
 Method: Non-negative Regularization; No Smoothing

Standard Deviation of Fit: 0.00193, cm³/g

Isotherm Table

Relative Pressure	Experimental Quantity Adsorbed (cm ³ /g STP)	Fitted Quantity Adsorbed (cm ³ /g STP)	Absolute Residual (cm ³ /g STP)	Relative Residual
0.011783670	0.0397	0.0404	-0.0007	-0.016487
0.014515520	0.0407	0.0410	-0.0003	-0.007698
0.017706521	0.0418	0.0417	0.0001	0.003434
0.021398440	0.0431	0.0424	0.0007	0.015719
0.025631230	0.0444	0.0432	0.0012	0.027501
0.030442240	0.0456	0.0440	0.0017	0.036539
0.035865448	0.0468	0.0449	0.0020	0.042345
0.041930798	0.0480	0.0458	0.0022	0.045272
0.048663601	0.0492	0.0470	0.0023	0.045777
0.056084011	0.0502	0.0482	0.0020	0.039736
0.064206667	0.0513	0.0497	0.0017	0.032448
0.073040441	0.0525	0.0513	0.0013	0.024259
0.082588248	0.0537	0.0530	0.0007	0.013812
0.092847057	0.0549	0.0548	0.0001	0.001095
0.103808001	0.0561	0.0566	-0.0006	-0.010245
0.115456402	0.0572	0.0584	-0.0011	-0.019411
0.127772301	0.0585	0.0600	-0.0015	-0.025510
0.140730694	0.0598	0.0615	-0.0017	-0.028877
0.154301897	0.0611	0.0629	-0.0019	-0.030301
0.168452203	0.0624	0.0643	-0.0019	-0.030385
0.183144197	0.0637	0.0656	-0.0018	-0.028993
0.198337302	0.0651	0.0668	-0.0017	-0.026481
0.213988706	0.0665	0.0680	-0.0015	-0.023220
0.230053306	0.0679	0.0692	-0.0013	-0.019634
0.246484801	0.0693	0.0704	-0.0011	-0.015646
0.263235897	0.0708	0.0716	-0.0008	-0.011093
0.280259013	0.0724	0.0729	-0.0005	-0.006481
0.297506303	0.0740	0.0741	-0.0002	-0.002316
0.314930797	0.0756	0.0756	0.0000	-0.000429
0.332486212	0.0772	0.0770	0.0002	0.001955
0.350127310	0.0788	0.0785	0.0003	0.003395
0.367810607	0.0804	0.0802	0.0002	0.002840
0.385494202	0.0821	0.0818	0.0003	0.003425
0.403138310	0.0838	0.0835	0.0003	0.003186
0.420704991	0.0854	0.0853	0.0002	0.002072
0.438158900	0.0871	0.0870	0.0001	0.000820
0.455466807	0.0887	0.0887	0.0000	-0.000123

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Sample: STONE3
 Operator:
 Submitter:
 Source File: D:\DATA\2020\EVA\STONE3.SMP

Started: 2010-08-18 9:26:17 Analysis Adsorptive: N2
 Completed: 2010-08-18 14:45:14 Analysis Bath: 77.395 K
 Report Time: 2010-12-22 11:55:20 Thermal Correction: No
 Sample Mass: 13.6461 g Equil. Interval: 10 s
 Warm Freespace: 22.4610 cm³ Cold Freespace: 65.3565 cm³

Porosity Distribution by Original Density Functional Theory
 Model: N2 @ 77K on Carbon, Slit Pores
 Method: Non-negative Regularization; No Smoothing

Standard Deviation of Fit: 0.00193, cm³/g

Isotherm Table

Relative Pressure	Experimental Quantity Adsorbed (cm ³ /g STP)	Fitted Quantity Adsorbed (cm ³ /g STP)	Absolute Residual (cm ³ /g STP)	Relative Residual
0.472598106	0.0903	0.0903	0.0000	-0.000530
0.489524394	0.0919	0.0919	0.0000	-0.000446
0.506219923	0.0935	0.0935	0.0000	0.000006
0.522661209	0.0951	0.0950	0.0001	0.000937
0.538827300	0.0967	0.0968	-0.0001	-0.000700
0.554699600	0.0983	0.0982	0.0001	0.000561
0.570261598	0.0999	0.0997	0.0002	0.001940
0.585499227	0.1015	0.1015	0.0000	0.000092
0.600400090	0.1031	0.1030	0.0001	0.001369
0.614954293	0.1048	0.1049	-0.0002	-0.001480
0.629153311	0.1065	0.1065	0.0000	0.000460
0.642990828	0.1083	0.1081	0.0002	0.002269
0.656461716	0.1101	0.1102	-0.0001	-0.000460
0.669562697	0.1121	0.1119	0.0002	0.001478
0.682291925	0.1141	0.1144	-0.0002	-0.002180
0.694648683	0.1162	0.1162	0.0000	0.000321
0.706633508	0.1183	0.1180	0.0003	0.002668
0.718248010	0.1205	0.1207	-0.0002	-0.001998
0.729494929	0.1228	0.1224	0.0004	0.002703
0.740377605	0.1252	0.1255	-0.0003	-0.002707
0.750900388	0.1276	0.1271	0.0004	0.003274
0.761068285	0.1300	0.1304	-0.0004	-0.002894
0.770887017	0.1324	0.1319	0.0004	0.003368
0.780362606	0.1351	0.1364	-0.0013	-0.009965
0.789501607	0.1380	0.1380	0.0000	-0.000053
0.798311174	0.1410	0.1396	0.0014	0.010100
0.806798697	0.1440	0.1447	-0.0006	-0.004427
0.814971626	0.1470	0.1463	0.0007	0.004706
0.822837889	0.1500	0.1508	-0.0008	-0.005124
0.830405474	0.1533	0.1525	0.0008	0.005326
0.837682605	0.1568	0.1577	-0.0009	-0.005496
0.844677329	0.1604	0.1595	0.0009	0.005639
0.851397991	0.1639	0.1648	-0.0008	-0.004976
0.857852995	0.1674	0.1666	0.0009	0.005097
0.864050388	0.1707	0.1715	-0.0008	-0.004671
0.869998574	0.1741	0.1733	0.0008	0.004773
0.875705481	0.1780	0.1793	-0.0013	-0.007374

Micromeritics Instrument Corporation

DFT Plus(R) V3.00 (ASAP 2020 V1.05)

Unit 1

Page 5

Sample: STONE3
 Operator:
 Submitter:
 Source File: D:\DATA\2020\EVA\STONE3.SMP

Started: 2010-08-18 9:26:17 Analysis Adsorptive: N2
 Completed: 2010-08-18 14:45:14 Analysis Bath: 77.395 K
 Report Time: 2010-12-22 11:55:20 Thermal Correction: No
 Sample Mass: 13.6461 g Equil. Interval: 10 s
 Warm Freespace: 22.4610 cm³ Cold Freespace: 65.3565 cm³

Porosity Distribution by Original Density Functional Theory
 Model: N2 @ 77K on Carbon, Slit Pores
 Method: Non-negative Regularization; No Smoothing

Standard Deviation of Fit: 0.00193, cm³/g

Isotherm Table

Relative Pressure	Experimental Quantity Adsorbed (cm ³ /g STP)	Fitted Quantity Adsorbed (cm ³ /g STP)	Absolute Residual (cm ³ /g STP)	Relative Residual
0.881179392	0.1823	0.1809	0.0013	0.007369
0.886428118	0.1868	0.1883	-0.0015	-0.008092
0.891459525	0.1915	0.1899	0.0015	0.008040
0.896281302	0.1961	0.1976	-0.0015	-0.007496
0.900900900	0.2007	0.1992	0.0015	0.007447
0.905325770	0.2051	0.2064	-0.0013	-0.006179
0.909563184	0.2094	0.2081	0.0013	0.006156
0.913620114	0.2134	0.2141	-0.0008	-0.003538
0.917503417	0.2167	0.2159	0.0008	0.003567
0.921219707	0.2189	0.2186	0.0002	0.001105
0.924775481	0.2205	0.2205	0.0000	0.000154
0.928177178	0.2221	0.2223	-0.0002	-0.000907
0.931430817	0.2241	0.2241	0.0000	-0.000217
0.934542298	0.2267	0.2275	-0.0009	-0.003775
0.937517405	0.2301	0.2293	0.0009	0.003776
0.940361619	0.2346	0.2365	-0.0019	-0.008153
0.943080306	0.2401	0.2382	0.0019	0.008023
0.945678592	0.2468	0.2498	-0.0030	-0.012252
0.948161721	0.2545	0.2515	0.0030	0.011935
0.950534225	0.2634	0.2634	0.0000	0.000030
0.952800930	0.2733	0.2778	-0.0045	-0.016563
0.954966187	0.2842	0.2796	0.0045	0.015978
0.957034409	0.2960	0.3013	-0.0054	-0.018120
0.959009588	0.3086	0.3033	0.0054	0.017423
0.960896015	0.3220	0.3275	-0.0055	-0.017197
0.962697208	0.3349	0.3294	0.0055	0.016569
0.964416981	0.3473	0.3523	-0.0050	-0.014446
0.966058910	0.3591	0.3541	0.0050	0.013998
0.967626274	0.3704	0.3704	0.0000	0.000007
0.969122529	0.3812	0.3855	-0.0043	-0.011235
0.970550597	0.3915	0.3872	0.0043	0.010957
0.971913695	0.4013	0.4051	-0.0038	-0.009439
0.973214507	0.4107	0.4069	0.0038	0.009237
0.974455774	0.4196	0.4229	-0.0033	-0.007849
0.975640416	0.4281	0.4248	0.0033	0.007704
0.976770699	0.4363	0.4363	0.0000	0.000002
0.977849126	0.4440	0.4467	-0.0027	-0.006089

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DFT Plus(R) V3.00 (ASAP 2020 V1.05)

Unit 1

Page 6

Sample: STONE3
 Operator:
 Submitter:
 Source File: D:\DATA\2020\EVA\STONE3.SMP

Started: 2010-08-18 9:26:17 Analysis Adsorptive: N2
 Completed: 2010-08-18 14:45:14 Analysis Bath: 77.395 K
 Report Time: 2010-12-22 11:55:20 Thermal Correction: No
 Sample Mass: 13.6461 g Equil. Interval: 10 s
 Warm Freespace: 22.4610 cm³ Cold Freespace: 65.3565 cm³

Porosity Distribution by Original Density Functional Theory
 Model: N2 @ 77K on Carbon, Slit Pores
 Method: Non-negative Regularization; No Smoothing

Standard Deviation of Fit: 0.00193, cm³/g

Isotherm Table

Relative Pressure	Experimental Quantity Adsorbed (cm ³ /g STP)	Fitted Quantity Adsorbed (cm ³ /g STP)	Absolute Residual (cm ³ /g STP)	Relative Residual
0.978878021	0.4514	0.4487	0.0027	0.005996
0.979859591	0.4585	0.4609	-0.0024	-0.005273
0.980795979	0.4653	0.4628	0.0024	0.005202
0.981689274	0.4717	0.4717	0.0000	0.000001
0.982541502	0.4778	0.4798	-0.0020	-0.004119
0.983354270	0.4837	0.4817	0.0020	0.004072
0.984129488	0.4893	0.4909	-0.0016	-0.003308
0.984869003	0.4946	0.4930	0.0016	0.003275
0.985574186	0.4997	0.4997	0.0000	0.000000

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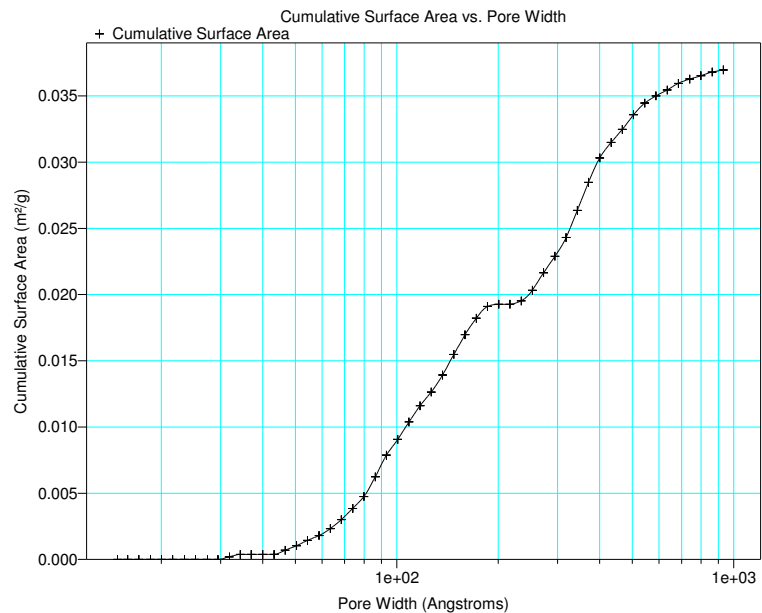
DFT Plus(R) V3.00 (ASAP 2020 V1.05) Unit 1 Page 7

Sample: STONE3
 Operator:
 Submitter:
 Source File: D:\DATA\2020\EVA\STONE3.SMP

Started: 2010-08-18 9:26:17 Analysis Adsorptive: N2
 Completed: 2010-08-18 14:45:14 Analysis Bath: 77.395 K
 Report Time: 2010-12-22 11:55:20 Thermal Correction: No
 Sample Mass: 13.6461 g Equil. Interval: 10 s
 Warm Freespace: 22.4610 cm³ Cold Freespace: 65.3565 cm³

Porosity Distribution by Original Density Functional Theory
 Model: N2 @ 77K on Carbon, Slit Pores
 Method: Non-negative Regularization; No Smoothing

Volume in Pores <	14.83 Å	:	0.00002 cm ³ /g
Total Volume in Pores <=	931.26 Å	:	0.00050 cm ³ /g
Area in Pores >	931.26 Å	:	0.094 m ² /g
Total Area in Pores >=	14.83 Å	:	0.131 m ² /g



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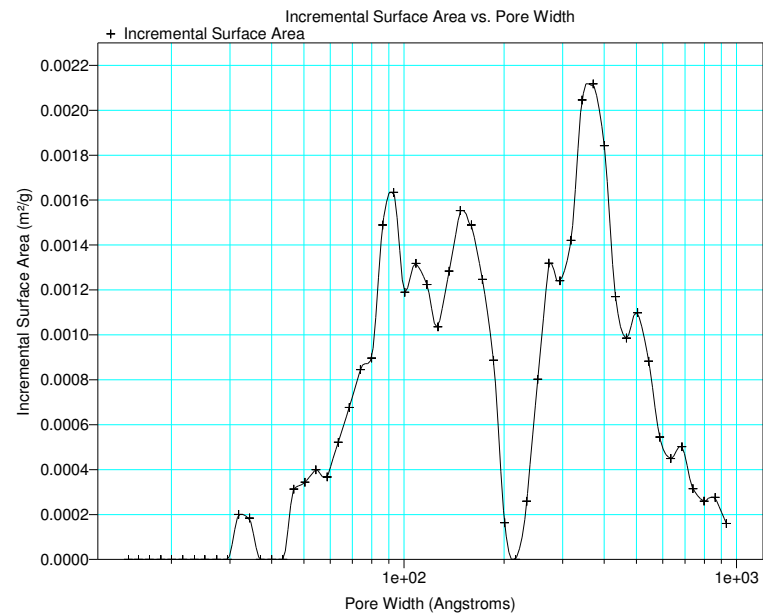
DFT Plus(R) V3.00 (ASAP 2020 V1.05) Unit 1 Page 8

Sample: STONE3
 Operator:
 Submitter:
 Source File: D:\DATA\2020\EVA\STONE3.SMP

Started: 2010-08-18 9:26:17 Analysis Adsorptive: N2
 Completed: 2010-08-18 14:45:14 Analysis Bath: 77.395 K
 Report Time: 2010-12-22 11:55:20 Thermal Correction: No
 Sample Mass: 13.6461 g Equil. Interval: 10 s
 Warm Freespace: 22.4610 cm³ Cold Freespace: 65.3565 cm³

Porosity Distribution by Original Density Functional Theory
 Model: N2 @ 77K on Carbon, Slit Pores
 Method: Non-negative Regularization; No Smoothing

Volume in Pores <	14.83 Å	:	0.00002 cm ³ /g
Total Volume in Pores <=	931.26 Å	:	0.00050 cm ³ /g
Area in Pores >	931.26 Å	:	0.094 m ² /g
Total Area in Pores >=	14.83 Å	:	0.131 m ² /g



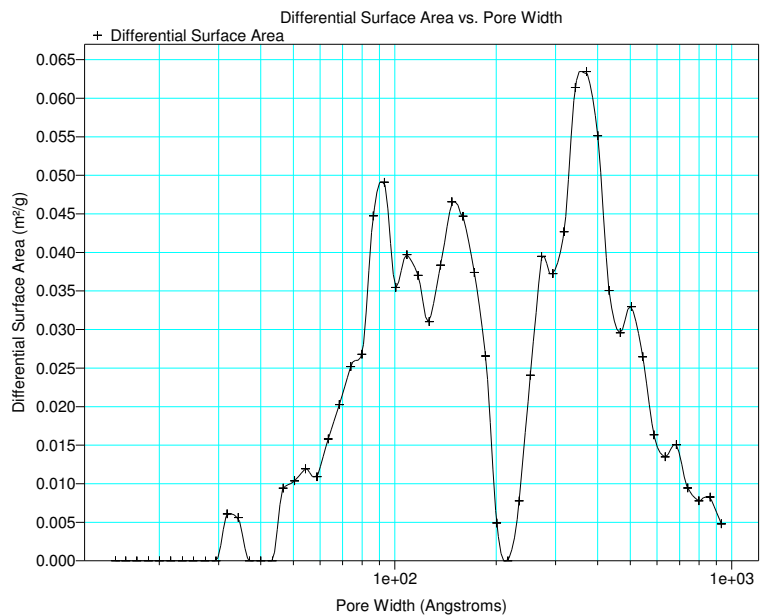
Micromeritics Instrument Corporation

DFT Plus(R) V3.00 (ASAP 2020 V1.05) Unit 1 Page 9

Sample: STONE3
 Operator:
 Submitter:
 Source File: D:\DATA\2020\EVA\STONE3.SMP
 Started: 2010-08-18 9:26:17 Analysis Adsorptive: N2
 Completed: 2010-08-18 14:45:14 Analysis Bath: 77.395 K
 Report Time: 2010-12-22 11:55:20 Thermal Correction: No
 Sample Mass: 13.6461 g Equil. Interval: 10 s
 Warm Freespace: 22.4610 cm³ Cold Freespace: 65.3565 cm³

Porosity Distribution by Original Density Functional Theory
 Model: N2 @ 77K on Carbon, Slit Pores
 Method: Non-negative Regularization; No Smoothing

Volume in Pores <	14.83 Å	:	0.00002 cm ³ /g
Total Volume in Pores <=	931.26 Å	:	0.00050 cm ³ /g
Area in Pores >	931.26 Å	:	0.094 m ² /g
Total Area in Pores >=	14.83 Å	:	0.131 m ² /g



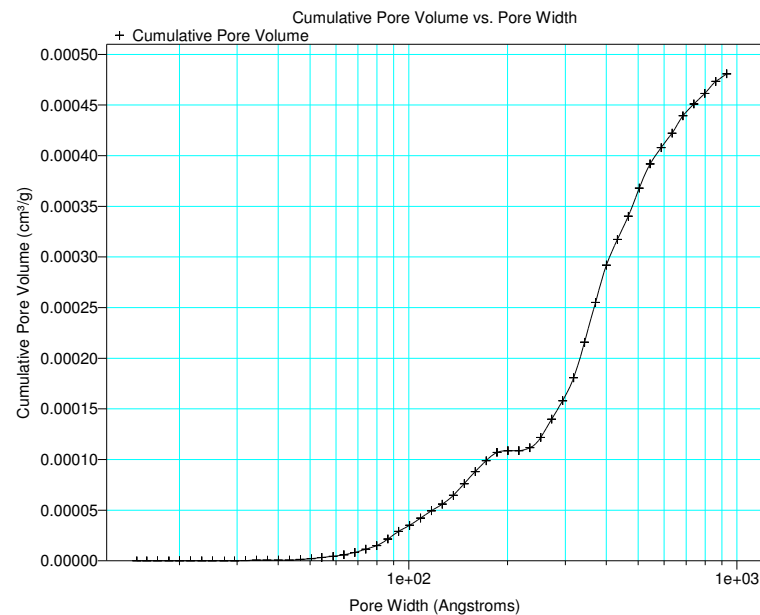
Micromeritics Instrument Corporation

DFT Plus(R) V3.00 (ASAP 2020 V1.05) Unit 1 Page 10

Sample: STONE3
 Operator:
 Submitter:
 Source File: D:\DATA\2020\EVA\STONE3.SMP
 Started: 2010-08-18 9:26:17 Analysis Adsorptive: N2
 Completed: 2010-08-18 14:45:14 Analysis Bath: 77.395 K
 Report Time: 2010-12-22 11:55:20 Thermal Correction: No
 Sample Mass: 13.6461 g Equil. Interval: 10 s
 Warm Freespace: 22.4610 cm³ Cold Freespace: 65.3565 cm³

Porosity Distribution by Original Density Functional Theory
 Model: N2 @ 77K on Carbon, Slit Pores
 Method: Non-negative Regularization; No Smoothing

Volume in Pores <	14.83 Å	:	0.00002 cm ³ /g
Total Volume in Pores <=	931.26 Å	:	0.00050 cm ³ /g
Area in Pores >	931.26 Å	:	0.094 m ² /g
Total Area in Pores >=	14.83 Å	:	0.131 m ² /g



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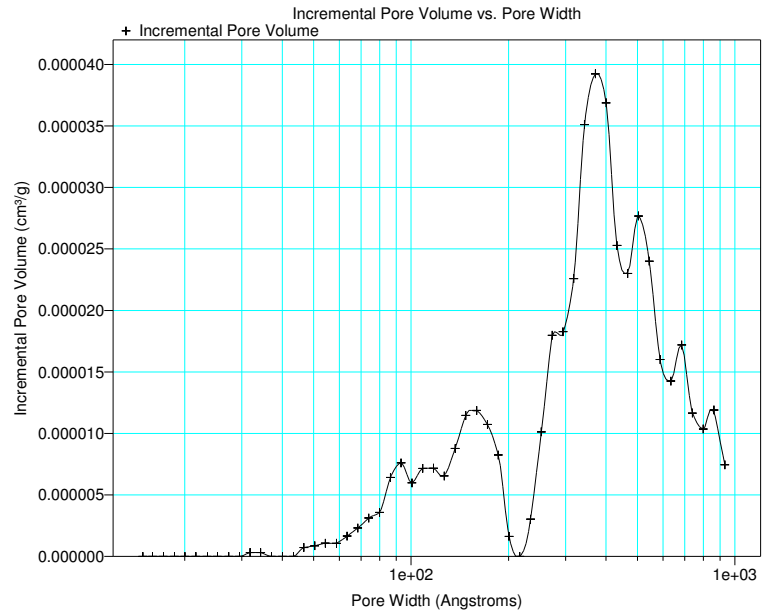
DFT Plus(R) V3.00 (ASAP 2020 V1.05) Unit 1 Page11

Sample: STONE3
 Operator:
 Submitter:
 Source File: D:\DATA\2020\EVA\STONE3.SMP

Started: 2010-08-18 9:26:17 Analysis Adsorptive: N2
 Completed: 2010-08-18 14:45:14 Analysis Bath: 77.395 K
 Report Time: 2010-12-22 11:55:20 Thermal Correction: No
 Sample Mass: 13.6461 g Equil. Interval: 10 s
 Warm Freespace: 22.4610 cm³ Cold Freespace: 65.3565 cm³

Porosity Distribution by Original Density Functional Theory
 Model: N2 @ 77K on Carbon, Slit Pores
 Method: Non-negative Regularization; No Smoothing

Volume in Pores <	14.83 Å	:	0.00002 cm ³ /g
Total Volume in Pores <=	931.26 Å	:	0.00050 cm ³ /g
Area in Pores >	931.26 Å	:	0.094 m ² /g
Total Area in Pores >=	14.83 Å	:	0.131 m ² /g



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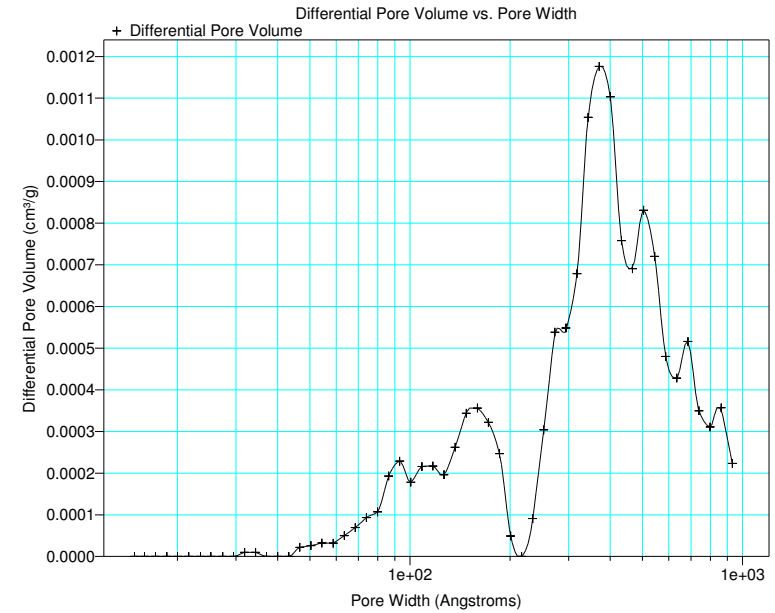
DFT Plus(R) V3.00 (ASAP 2020 V1.05) Unit 1 Page12

Sample: STONE3
 Operator:
 Submitter:
 Source File: D:\DATA\2020\EVA\STONE3.SMP

Started: 2010-08-18 9:26:17 Analysis Adsorptive: N2
 Completed: 2010-08-18 14:45:14 Analysis Bath: 77.395 K
 Report Time: 2010-12-22 11:55:20 Thermal Correction: No
 Sample Mass: 13.6461 g Equil. Interval: 10 s
 Warm Freespace: 22.4610 cm³ Cold Freespace: 65.3565 cm³

Porosity Distribution by Original Density Functional Theory
 Model: N2 @ 77K on Carbon, Slit Pores
 Method: Non-negative Regularization; No Smoothing

Volume in Pores <	14.83 Å	:	0.00002 cm ³ /g
Total Volume in Pores <=	931.26 Å	:	0.00050 cm ³ /g
Area in Pores >	931.26 Å	:	0.094 m ² /g
Total Area in Pores >=	14.83 Å	:	0.131 m ² /g



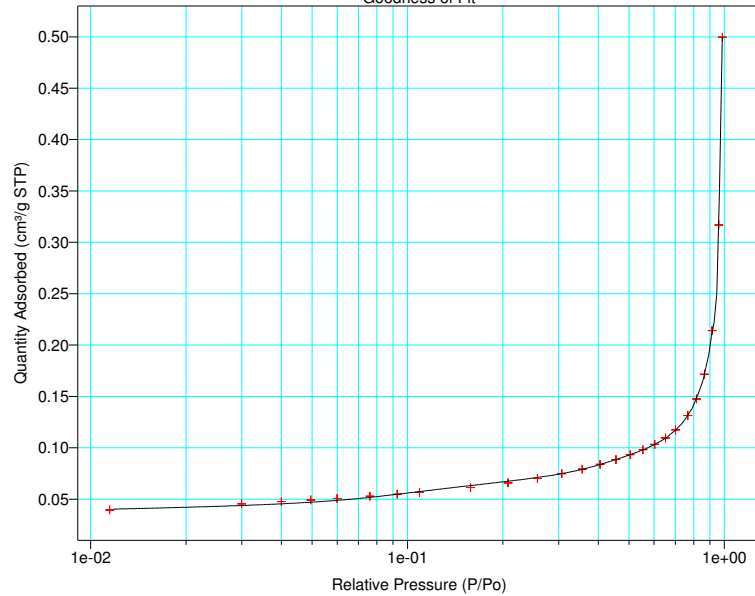
Micromeritics Instrument Corporation

DFT Plus(R) V3.00 (ASAP 2020 V1.05) Unit 1 Page13

Sample: STONE3
Operator:
Submitter:
Source File: D:\DATA\2020\EVA\STONE3.SMP
Started: 2010-08-18 9:26:17 Analysis Adsorptive: N2
Completed: 2010-08-18 14:45:14 Analysis Bath: 77.395 K
Report Time: 2010-12-22 11:55:20 Thermal Correction: No
Sample Mass: 13.6461 g Equil. Interval: 10 s
Warm Freespace: 22.4610 cm³ Cold Freespace: 65.3565 cm³

Porosity Distribution by Original Density Functional Theory
Model: N2 @ 77K on Carbon, Slit Pores
Method: Non-negative Regularization; No Smoothing

Standard Deviation of Fit: 0.00193, cm³/g
Goodness of Fit



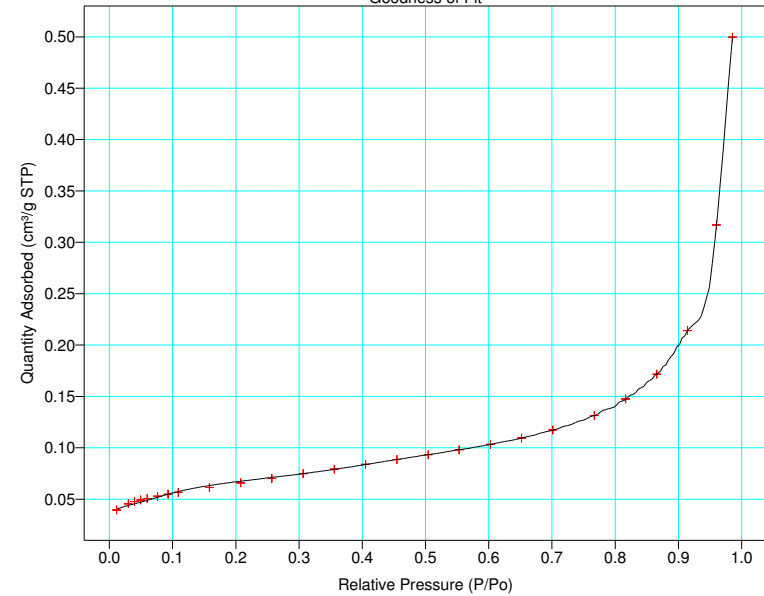
Micromeritics Instrument Corporation

DFT Plus(R) V3.00 (ASAP 2020 V1.05) Unit 1 Page14

Sample: STONE3
Operator:
Submitter:
Source File: D:\DATA\2020\EVA\STONE3.SMP
Started: 2010-08-18 9:26:17 Analysis Adsorptive: N2
Completed: 2010-08-18 14:45:14 Analysis Bath: 77.395 K
Report Time: 2010-12-22 11:55:20 Thermal Correction: No
Sample Mass: 13.6461 g Equil. Interval: 10 s
Warm Freespace: 22.4610 cm³ Cold Freespace: 65.3565 cm³

Porosity Distribution by Original Density Functional Theory
Model: N2 @ 77K on Carbon, Slit Pores
Method: Non-negative Regularization; No Smoothing

Standard Deviation of Fit: 0.00193, cm³/g
Goodness of Fit



A2.13 Pore size distributions (PSD) according to the density functional theory (DFT) (as referenced to in Section 3.2.2) for the HV sample size fraction 0.5–1 mm (duplicate)

Micromeritics Instrument Corporation
 DFT Plus(R) V3.00 (ASAP 2020 V1.05) Unit 1 Page 1
 Sample: S0.5-1
 Operator:
 Submitter:
 Source File: D:\DATA\2020\EVA\S0.5-1
 Started: 2010-10-29 11:05:26 Analysis Adsorptive: N2
 Completed: 2010-10-29 15:48:56 Analysis Bath: 77.429 K
 Report Time: 2010-12-22 11:54:11 Thermal Correction: No
 Sample Mass: 13.2809 g Equil. Interval: 10 s
 Warm Freespace: 22.6921 cm³ Cold Freespace: 66.0676 cm³

Porosity Distribution by Original Density Functional Theory
 Model: N2 @ 77K on Carbon, Slit Pores
 Method: Non-negative Regularization; No Smoothing

Volume in Pores	<	14.83 Å	:	0.00000 cm ³ /g
Total Volume in Pores	<=	862.45 Å	:	0.00047 cm ³ /g
Area in Pores	>	862.45 Å	:	0.090 m ² /g
Total Area in Pores	>=	14.83 Å	:	0.135 m ² /g

Pore Size Table

Pore Width (Å)	Cumulative Volume (cm ³ /g)	Incremental Volume (cm ³ /g)	Cumulative Area (m ² /g)	Incremental Area (m ² /g)
14.83	0.00000	0.00000	0.000	0.000
15.91	0.00000	0.00000	0.000	0.000
17.16	0.00000	0.00000	0.000	0.000
18.59	0.00000	0.00000	0.000	0.000
20.02	0.00000	0.00000	0.000	0.000
21.62	0.00000	0.00000	0.000	0.000
23.41	0.00000	0.00000	0.000	0.000
25.20	0.00000	0.00000	0.000	0.000
27.34	0.00000	0.00000	0.000	0.000
29.49	0.00000	0.00000	0.000	0.000
31.81	0.00000	0.00000	0.003	0.002
34.31	0.00001	0.00000	0.004	0.001
36.99	0.00001	0.00000	0.004	0.000
40.03	0.00001	0.00000	0.004	0.000
43.25	0.00001	0.00000	0.005	0.001
46.64	0.00001	0.00000	0.006	0.001
50.40	0.00001	0.00000	0.007	0.001
54.33	0.00002	0.00000	0.008	0.001
58.80	0.00002	0.00000	0.009	0.001
63.44	0.00002	0.00000	0.010	0.001
68.45	0.00003	0.00001	0.012	0.001
73.99	0.00003	0.00001	0.013	0.001
79.88	0.00004	0.00001	0.014	0.001
86.32	0.00005	0.00001	0.016	0.002
93.11	0.00005	0.00001	0.018	0.002
100.61	0.00006	0.00001	0.019	0.001
108.66	0.00007	0.00001	0.020	0.001
117.23	0.00007	0.00001	0.021	0.001
126.53	0.00008	0.00001	0.022	0.001
136.71	0.00009	0.00001	0.023	0.001
147.61	0.00010	0.00001	0.025	0.001
159.41	0.00011	0.00001	0.026	0.001
172.10	0.00012	0.00001	0.027	0.001
185.86	0.00013	0.00001	0.028	0.001

Micromeritics Instrument Corporation
 DFT Plus(R) V3.00 (ASAP 2020 V1.05) Unit 1 Page 2
 Sample: S0.5-1
 Operator:
 Submitter:
 Source File: D:\DATA\2020\EVA\S0.5-1
 Started: 2010-10-29 11:05:26 Analysis Adsorptive: N2
 Completed: 2010-10-29 15:48:56 Analysis Bath: 77.429 K
 Report Time: 2010-12-22 11:54:11 Thermal Correction: No
 Sample Mass: 13.2809 g Equil. Interval: 10 s
 Warm Freespace: 22.6921 cm³ Cold Freespace: 66.0676 cm³

Porosity Distribution by Original Density Functional Theory
 Model: N2 @ 77K on Carbon, Slit Pores
 Method: Non-negative Regularization; No Smoothing

Volume in Pores	<	14.83 Å	:	0.00000 cm ³ /g
Total Volume in Pores	<=	862.45 Å	:	0.00047 cm ³ /g
Area in Pores	>	862.45 Å	:	0.090 m ² /g
Total Area in Pores	>=	14.83 Å	:	0.135 m ² /g

Pore Size Table

Pore Width (Å)	Cumulative Volume (cm ³ /g)	Incremental Volume (cm ³ /g)	Cumulative Area (m ² /g)	Incremental Area (m ² /g)
200.69	0.00013	0.00000	0.028	0.000
216.60	0.00013	0.00000	0.028	0.000
233.93	0.00013	0.00000	0.028	0.000
252.52	0.00014	0.00001	0.029	0.001
272.71	0.00015	0.00002	0.030	0.001
294.51	0.00017	0.00002	0.031	0.001
317.92	0.00019	0.00002	0.033	0.001
343.30	0.00023	0.00003	0.035	0.002
370.64	0.00026	0.00004	0.037	0.002
400.31	0.00030	0.00003	0.038	0.002
432.30	0.00032	0.00002	0.040	0.001
466.79	0.00034	0.00002	0.040	0.001
503.96	0.00037	0.00003	0.042	0.001
544.17	0.00039	0.00002	0.042	0.001
587.60	0.00040	0.00001	0.043	0.001
634.42	0.00042	0.00001	0.043	0.000
684.99	0.00043	0.00002	0.044	0.000
739.68	0.00044	0.00001	0.044	0.000
798.65	0.00045	0.00001	0.044	0.000
862.45	0.00047	0.00001	0.045	0.000

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DFT Plus(R) V3.00 (ASAP 2020 V1.05) Unit 1 Page 3

Sample: S0.5-1
 Operator:
 Submitter:
 Source File: D:\DATA\2020\EVA\S0.5-1

Started: 2010-10-29 11:05:26 Analysis Adsorptive: N2
 Completed: 2010-10-29 15:48:56 Analysis Bath: 77.429 K
 Report Time: 2010-12-22 11:54:11 Thermal Correction: No
 Sample Mass: 13.2809 g Equil. Interval: 10 s
 Warm Freespace: 22.6921 cm³ Cold Freespace: 66.0676 cm³

Porosity Distribution by Original Density Functional Theory
 Model: N2 @ 77K on Carbon, Slit Pores
 Method: Non-negative Regularization; No Smoothing

Standard Deviation of Fit: 0.00180, cm³/g

Isotherm Table

Relative Pressure	Experimental Quantity Adsorbed (cm ³ /g STP)	Fitted Quantity Adsorbed (cm ³ /g STP)	Absolute Residual (cm ³ /g STP)	Relative Residual
0.011783670	0.0282	0.0291	-0.0009	-0.031372
0.014515520	0.0291	0.0297	-0.0006	-0.021082
0.017706521	0.0302	0.0304	-0.0002	-0.007838
0.021398440	0.0313	0.0311	0.0002	0.006935
0.025631230	0.0325	0.0318	0.0007	0.021406
0.030442240	0.0338	0.0327	0.0011	0.033252
0.035865448	0.0350	0.0335	0.0014	0.041311
0.041930798	0.0362	0.0345	0.0016	0.044684
0.048663601	0.0373	0.0357	0.0017	0.044780
0.056084011	0.0385	0.0369	0.0016	0.040434
0.064206667	0.0397	0.0384	0.0013	0.032961
0.073040441	0.0410	0.0400	0.0009	0.022766
0.082588248	0.0422	0.0418	0.0004	0.009038
0.092847057	0.0435	0.0437	-0.0002	-0.005183
0.103808001	0.0448	0.0455	-0.0008	-0.016992
0.115456402	0.0461	0.0473	-0.0012	-0.026192
0.127772301	0.0475	0.0490	-0.0015	-0.032084
0.140730694	0.0488	0.0505	-0.0017	-0.034963
0.154301897	0.0502	0.0520	-0.0018	-0.035584
0.168452203	0.0516	0.0534	-0.0018	-0.034391
0.183144197	0.0530	0.0547	-0.0017	-0.031161
0.198337302	0.0545	0.0559	-0.0014	-0.026459
0.213988706	0.0560	0.0572	-0.0012	-0.020816
0.230053306	0.0576	0.0584	-0.0008	-0.014579
0.246484801	0.0592	0.0596	-0.0005	-0.008109
0.263235897	0.0608	0.0609	-0.0001	-0.001766
0.280259013	0.0624	0.0624	0.0001	0.000868
0.297506303	0.0641	0.0637	0.0004	0.006057
0.314930797	0.0658	0.0663	-0.0005	-0.007430
0.332486212	0.0679	0.0677	0.0002	0.002333
0.350127310	0.0700	0.0693	0.0007	0.010117
0.367810607	0.0717	0.0716	0.0001	0.001346
0.385494202	0.0734	0.0733	0.0001	0.001932
0.403138310	0.0752	0.0750	0.0001	0.001798
0.420704991	0.0769	0.0768	0.0001	0.001450
0.438158900	0.0786	0.0785	0.0001	0.001084
0.455466807	0.0803	0.0803	0.0000	-0.000333

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DFT Plus(R) V3.00 (ASAP 2020 V1.05) Unit 1 Page 4

Sample: S0.5-1
 Operator:
 Submitter:
 Source File: D:\DATA\2020\EVA\S0.5-1

Started: 2010-10-29 11:05:26 Analysis Adsorptive: N2
 Completed: 2010-10-29 15:48:56 Analysis Bath: 77.429 K
 Report Time: 2010-12-22 11:54:11 Thermal Correction: No
 Sample Mass: 13.2809 g Equil. Interval: 10 s
 Warm Freespace: 22.6921 cm³ Cold Freespace: 66.0676 cm³

Porosity Distribution by Original Density Functional Theory
 Model: N2 @ 77K on Carbon, Slit Pores
 Method: Non-negative Regularization; No Smoothing

Standard Deviation of Fit: 0.00180, cm³/g

Isotherm Table

Relative Pressure	Experimental Quantity Adsorbed (cm ³ /g STP)	Fitted Quantity Adsorbed (cm ³ /g STP)	Absolute Residual (cm ³ /g STP)	Relative Residual
0.472598106	0.0820	0.0820	0.0001	0.000612
0.489524394	0.0838	0.0836	0.0002	0.002472
0.506219923	0.0856	0.0856	0.0000	-0.000444
0.522661209	0.0874	0.0871	0.0002	0.002643
0.538827300	0.0892	0.0895	-0.0003	-0.003400
0.554699600	0.0910	0.0909	0.0000	0.000452
0.570261598	0.0928	0.0924	0.0004	0.004703
0.585499227	0.0948	0.0949	-0.0002	-0.001600
0.600400090	0.0967	0.0964	0.0003	0.003045
0.614954293	0.0986	0.0991	-0.0005	-0.004991
0.629153311	0.1007	0.1007	0.0000	0.000455
0.642990828	0.1029	0.1023	0.0006	0.005667
0.656461716	0.1050	0.1052	-0.0002	-0.002240
0.669562697	0.1073	0.1069	0.0003	0.003207
0.682291925	0.1097	0.1104	-0.0007	-0.006301
0.694648683	0.1121	0.1121	0.0000	0.000186
0.706633508	0.1146	0.1139	0.0008	0.006753
0.718248010	0.1173	0.1178	-0.0005	-0.004066
0.729494929	0.1200	0.1194	0.0006	0.004688
0.740377605	0.1228	0.1233	-0.0006	-0.004490
0.750900388	0.1256	0.1249	0.0006	0.004979
0.761068285	0.1283	0.1289	-0.0006	-0.004338
0.770887017	0.1310	0.1304	0.0006	0.004745
0.780362606	0.1339	0.1353	-0.0014	-0.010543
0.789501607	0.1368	0.1368	0.0000	0.000133
0.798311174	0.1398	0.1383	0.0015	0.010443
0.806798697	0.1427	0.1433	-0.0006	-0.004343
0.814971626	0.1456	0.1449	0.0007	0.004598
0.822837889	0.1485	0.1492	-0.0007	-0.004973
0.830405474	0.1517	0.1509	0.0008	0.005158
0.837682605	0.1550	0.1558	-0.0008	-0.005195
0.844677329	0.1584	0.1575	0.0008	0.005329
0.851397991	0.1617	0.1625	-0.0007	-0.004629
0.857852995	0.1650	0.1642	0.0008	0.004745
0.864050388	0.1681	0.1688	-0.0008	-0.004511
0.869998574	0.1713	0.1705	0.0008	0.004605
0.875705481	0.1750	0.1762	-0.0012	-0.007000

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DFT Plus(R) V3.00 (ASAP 2020 V1.05) Unit 1 Page 5

Sample: S0.5-1
 Operator:
 Submitter:
 Source File: D:\DATA\2020\EVA\S0.5-1

Started: 2010-10-29 11:05:26 Analysis Adsorptive: N2
 Completed: 2010-10-29 15:48:56 Analysis Bath: 77.429 K
 Report Time: 2010-12-22 11:54:11 Thermal Correction: No
 Sample Mass: 13.2809 g Equil. Interval: 10 s
 Warm Freespace: 22.6921 cm³ Cold Freespace: 66.0676 cm³

Porosity Distribution by Original Density Functional Theory
 Model: N2 @ 77K on Carbon, Slit Pores
 Method: Non-negative Regularization; No Smoothing

Standard Deviation of Fit: 0.00180, cm³/g

Isotherm Table

Relative Pressure	Experimental Quantity Adsorbed (cm ³ /g STP)	Fitted Quantity Adsorbed (cm ³ /g STP)	Absolute Residual (cm ³ /g STP)	Relative Residual
0.881179392	0.1790	0.1778	0.0013	0.006999
0.886428118	0.1833	0.1847	-0.0014	-0.007587
0.891459525	0.1876	0.1862	0.0014	0.007546
0.896281302	0.1920	0.1933	-0.0013	-0.006963
0.900900900	0.1962	0.1948	0.0014	0.006926
0.905325770	0.2003	0.2014	-0.0011	-0.005672
0.909563184	0.2042	0.2030	0.0012	0.005659
0.913620114	0.2079	0.2084	-0.0005	-0.002639
0.917503417	0.2107	0.2101	0.0006	0.002679
0.921219707	0.2125	0.2119	0.0005	0.002561
0.924775481	0.2138	0.2137	0.0001	0.000501
0.928177178	0.2151	0.2154	-0.0003	-0.001440
0.931430817	0.2169	0.2172	-0.0003	-0.001477
0.934542298	0.2192	0.2200	-0.0008	-0.003477
0.937517405	0.2224	0.2217	0.0008	0.003482
0.940361619	0.2266	0.2284	-0.0018	-0.007869
0.943080306	0.2318	0.2300	0.0018	0.007748
0.945678592	0.2381	0.2409	-0.0028	-0.011962
0.948161721	0.2454	0.2426	0.0029	0.011658
0.950534225	0.2538	0.2538	0.0000	0.000029
0.952800930	0.2632	0.2675	-0.0043	-0.016266
0.954966187	0.2735	0.2692	0.0043	0.015700
0.957034409	0.2847	0.2898	-0.0051	-0.017830
0.959009588	0.2967	0.2916	0.0051	0.017153
0.960896015	0.3093	0.3144	-0.0052	-0.016683
0.962697208	0.3214	0.3163	0.0052	0.016088
0.964416981	0.3330	0.3377	-0.0047	-0.014036
0.966058910	0.3441	0.3394	0.0047	0.013611
0.967626274	0.3546	0.3546	0.0000	0.000007
0.969122529	0.3647	0.3687	-0.0040	-0.010932
0.970550597	0.3744	0.3704	0.0040	0.010667
0.971913695	0.3835	0.3871	-0.0035	-0.009184
0.973214507	0.3923	0.3888	0.0035	0.008992
0.974455774	0.4007	0.4037	-0.0031	-0.007631
0.975640416	0.4087	0.4056	0.0031	0.007493
0.976770699	0.4163	0.4163	0.0000	0.000002
0.977849126	0.4236	0.4261	-0.0025	-0.005913

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DFT Plus(R) V3.00 (ASAP 2020 V1.05) Unit 1 Page 6

Sample: S0.5-1
 Operator:
 Submitter:
 Source File: D:\DATA\2020\EVA\S0.5-1

Started: 2010-10-29 11:05:26 Analysis Adsorptive: N2
 Completed: 2010-10-29 15:48:56 Analysis Bath: 77.429 K
 Report Time: 2010-12-22 11:54:11 Thermal Correction: No
 Sample Mass: 13.2809 g Equil. Interval: 10 s
 Warm Freespace: 22.6921 cm³ Cold Freespace: 66.0676 cm³

Porosity Distribution by Original Density Functional Theory
 Model: N2 @ 77K on Carbon, Slit Pores
 Method: Non-negative Regularization; No Smoothing

Standard Deviation of Fit: 0.00180, cm³/g

Isotherm Table

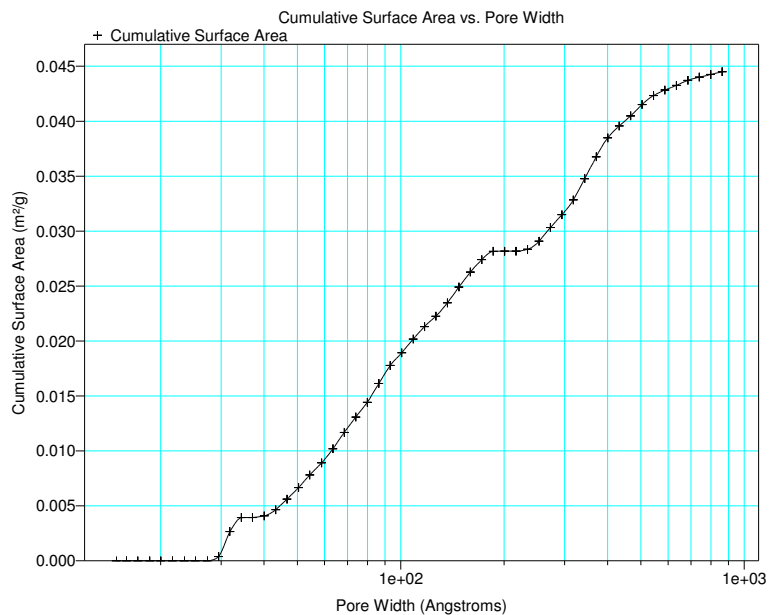
Relative Pressure	Experimental Quantity Adsorbed (cm ³ /g STP)	Fitted Quantity Adsorbed (cm ³ /g STP)	Absolute Residual (cm ³ /g STP)	Relative Residual
0.978878021	0.4305	0.4280	0.0025	0.005825
0.979859591	0.4371	0.4393	-0.0022	-0.005120
0.980795979	0.4434	0.4412	0.0022	0.005052
0.981689274	0.4494	0.4494	0.0000	0.000001
0.982541502	0.4552	0.4570	-0.0018	-0.003991
0.983354270	0.4607	0.4588	0.0018	0.003947
0.984129488	0.4659	0.4674	-0.0015	-0.003192
0.984869003	0.4709	0.4694	0.0015	0.003160

Sample: S0.5-1
 Operator:
 Submitter:
 Source File: D:\DATA\2020\EVA\S0.5-1

Started: 2010-10-29 11:05:26 Analysis Adsorptive: N2
 Completed: 2010-10-29 15:48:56 Analysis Bath: 77.429 K
 Report Time: 2010-12-22 11:54:11 Thermal Correction: No
 Sample Mass: 13.2809 g Equil. Interval: 10 s
 Warm Freespace: 22.6921 cm³ Cold Freespace: 66.0676 cm³

Porosity Distribution by Original Density Functional Theory
 Model: N2 @ 77K on Carbon, Slit Pores
 Method: Non-negative Regularization; No Smoothing

Volume in Pores <	14.83 Å	:	0.00000 cm ³ /g
Total Volume in Pores <=	862.45 Å	:	0.00047 cm ³ /g
Area in Pores >	862.45 Å	:	0.090 m ² /g
Total Area in Pores >=	14.83 Å	:	0.135 m ² /g

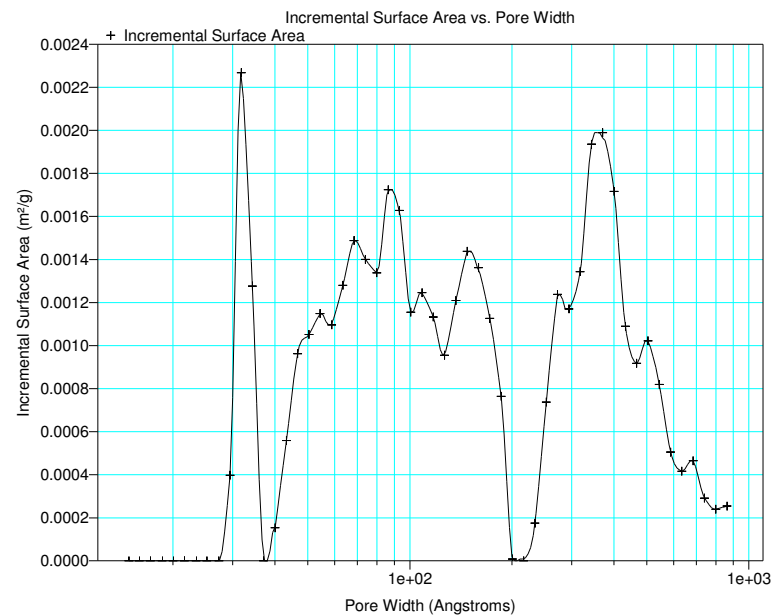


Sample: S0.5-1
 Operator:
 Submitter:
 Source File: D:\DATA\2020\EVA\S0.5-1

Started: 2010-10-29 11:05:26 Analysis Adsorptive: N2
 Completed: 2010-10-29 15:48:56 Analysis Bath: 77.429 K
 Report Time: 2010-12-22 11:54:11 Thermal Correction: No
 Sample Mass: 13.2809 g Equil. Interval: 10 s
 Warm Freespace: 22.6921 cm³ Cold Freespace: 66.0676 cm³

Porosity Distribution by Original Density Functional Theory
 Model: N2 @ 77K on Carbon, Slit Pores
 Method: Non-negative Regularization; No Smoothing

Volume in Pores <	14.83 Å	:	0.00000 cm ³ /g
Total Volume in Pores <=	862.45 Å	:	0.00047 cm ³ /g
Area in Pores >	862.45 Å	:	0.090 m ² /g
Total Area in Pores >=	14.83 Å	:	0.135 m ² /g



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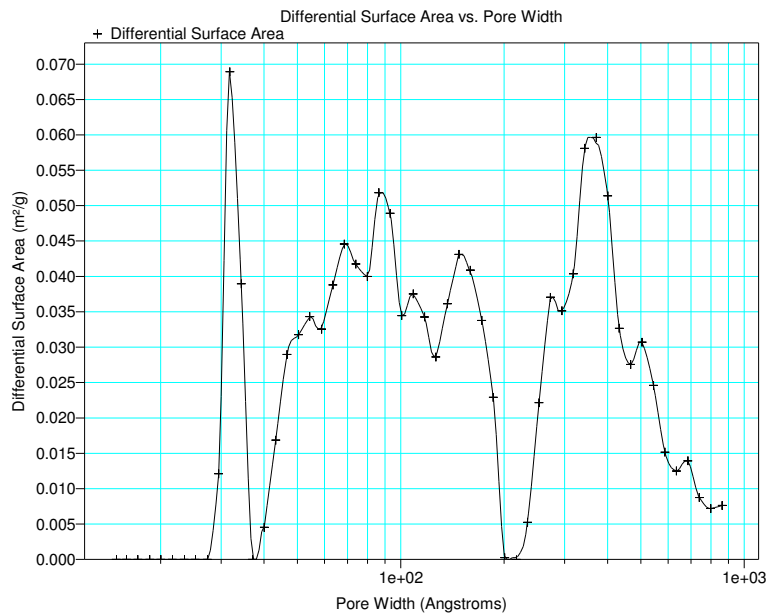
DFT Plus(R) V3.00 (ASAP 2020 V1.05) Unit 1 Page 9

Sample: S0.5-1
 Operator:
 Submitter:
 Source File: D:\DATA\2020\EVA\S0.5-1

Started: 2010-10-29 11:05:26 Analysis Adsorptive: N2
 Completed: 2010-10-29 15:48:56 Analysis Bath: 77.429 K
 Report Time: 2010-12-22 11:54:11 Thermal Correction: No
 Sample Mass: 13.2809 g Equil. Interval: 10 s
 Warm Freespace: 22.6921 cm³ Cold Freespace: 66.0676 cm³

Porosity Distribution by Original Density Functional Theory
 Model: N2 @ 77K on Carbon, Slit Pores
 Method: Non-negative Regularization; No Smoothing

Volume in Pores <	14.83 Å	:	0.00000 cm ³ /g
Total Volume in Pores <=	862.45 Å	:	0.00047 cm ³ /g
Area in Pores >	862.45 Å	:	0.090 m ² /g
Total Area in Pores >=	14.83 Å	:	0.135 m ² /g



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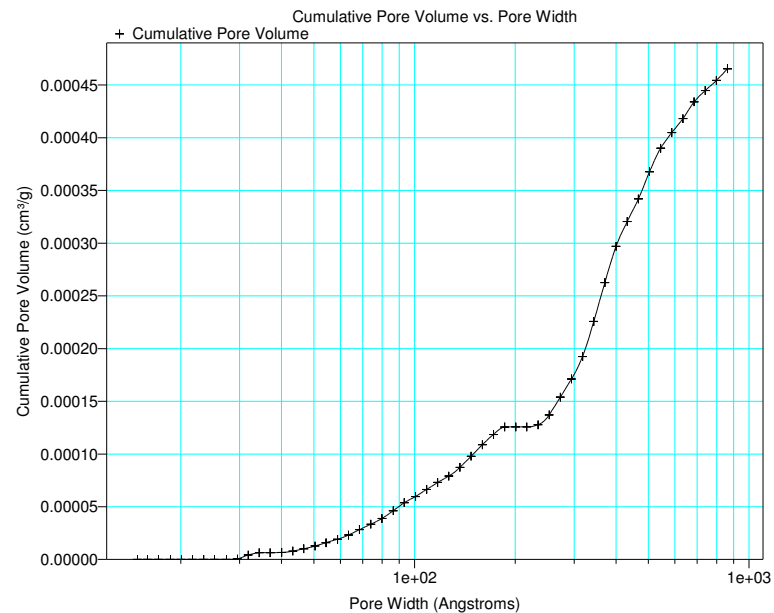
DFT Plus(R) V3.00 (ASAP 2020 V1.05) Unit 1 Page 10

Sample: S0.5-1
 Operator:
 Submitter:
 Source File: D:\DATA\2020\EVA\S0.5-1

Started: 2010-10-29 11:05:26 Analysis Adsorptive: N2
 Completed: 2010-10-29 15:48:56 Analysis Bath: 77.429 K
 Report Time: 2010-12-22 11:54:11 Thermal Correction: No
 Sample Mass: 13.2809 g Equil. Interval: 10 s
 Warm Freespace: 22.6921 cm³ Cold Freespace: 66.0676 cm³

Porosity Distribution by Original Density Functional Theory
 Model: N2 @ 77K on Carbon, Slit Pores
 Method: Non-negative Regularization; No Smoothing

Volume in Pores <	14.83 Å	:	0.00000 cm ³ /g
Total Volume in Pores <=	862.45 Å	:	0.00047 cm ³ /g
Area in Pores >	862.45 Å	:	0.090 m ² /g
Total Area in Pores >=	14.83 Å	:	0.135 m ² /g



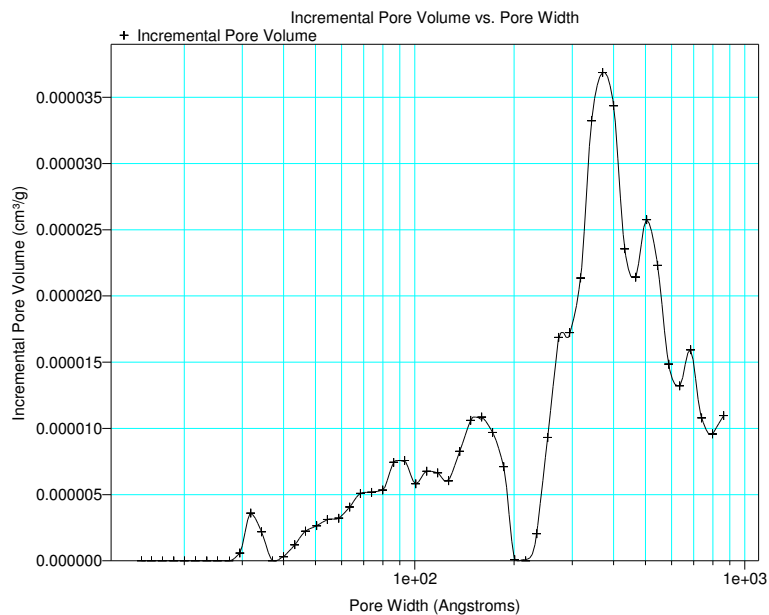
Micromeritics Instrument Corporation

DFT Plus(R) V3.00 (ASAP 2020 V1.05) Unit 1 Page11

Sample: S0.5-1
 Operator:
 Submitter:
 Source File: D:\DATA\2020\EVA\S0.5-1
 Started: 2010-10-29 11:05:26 Analysis Adsorptive: N2
 Completed: 2010-10-29 15:48:56 Analysis Bath: 77.429 K
 Report Time: 2010-12-22 11:54:11 Thermal Correction: No
 Sample Mass: 13.2809 g Equil. Interval: 10 s
 Warm Freespace: 22.6921 cm³ Cold Freespace: 66.0676 cm³

Porosity Distribution by Original Density Functional Theory
 Model: N2 @ 77K on Carbon, Slit Pores
 Method: Non-negative Regularization; No Smoothing

Volume in Pores <	14.83 Å	:	0.00000 cm ³ /g
Total Volume in Pores <=	862.45 Å	:	0.00047 cm ³ /g
Area in Pores >	862.45 Å	:	0.090 m ² /g
Total Area in Pores >=	14.83 Å	:	0.135 m ² /g



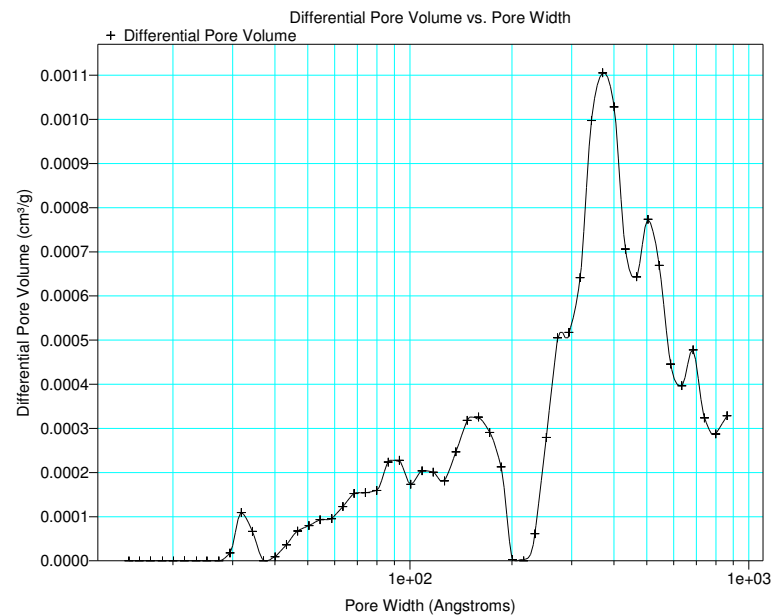
Micromeritics Instrument Corporation

DFT Plus(R) V3.00 (ASAP 2020 V1.05) Unit 1 Page12

Sample: S0.5-1
 Operator:
 Submitter:
 Source File: D:\DATA\2020\EVA\S0.5-1
 Started: 2010-10-29 11:05:26 Analysis Adsorptive: N2
 Completed: 2010-10-29 15:48:56 Analysis Bath: 77.429 K
 Report Time: 2010-12-22 11:54:11 Thermal Correction: No
 Sample Mass: 13.2809 g Equil. Interval: 10 s
 Warm Freespace: 22.6921 cm³ Cold Freespace: 66.0676 cm³

Porosity Distribution by Original Density Functional Theory
 Model: N2 @ 77K on Carbon, Slit Pores
 Method: Non-negative Regularization; No Smoothing

Volume in Pores <	14.83 Å	:	0.00000 cm ³ /g
Total Volume in Pores <=	862.45 Å	:	0.00047 cm ³ /g
Area in Pores >	862.45 Å	:	0.090 m ² /g
Total Area in Pores >=	14.83 Å	:	0.135 m ² /g



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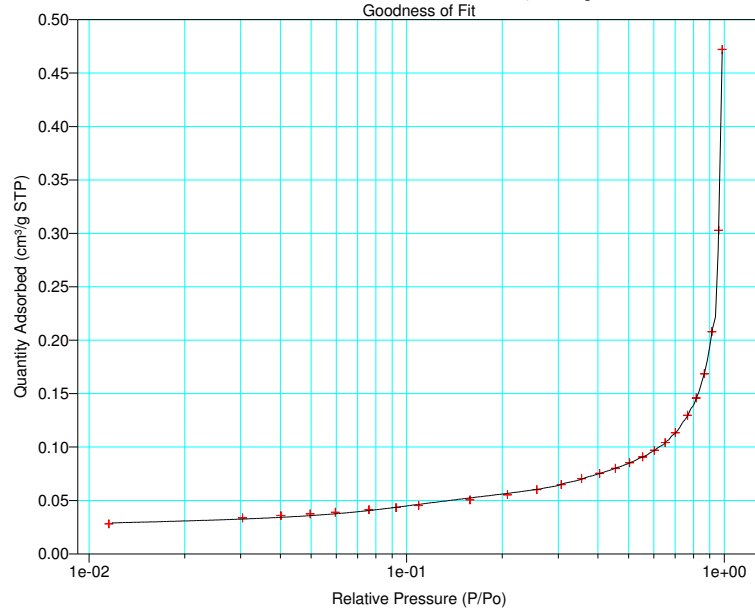
DFT Plus(R) V3.00 (ASAP 2020 V1.05) Unit 1 Page13

Sample: S0.5-1
 Operator:
 Submitter:
 Source File: D:\DATA\2020\EVA\S0.5-1

Started: 2010-10-29 11:05:26 Analysis Adsorptive: N2
 Completed: 2010-10-29 15:48:56 Analysis Bath: 77.429 K
 Report Time: 2010-12-22 11:54:11 Thermal Correction: No
 Sample Mass: 13.2809 g Equil. Interval: 10 s
 Warm Freespace: 22.6921 cm³ Cold Freespace: 66.0676 cm³

Porosity Distribution by Original Density Functional Theory
 Model: N2 @ 77K on Carbon, Slit Pores
 Method: Non-negative Regularization; No Smoothing

Standard Deviation of Fit: 0.00180, cm³/g



Micromeritics Instrument Corporation

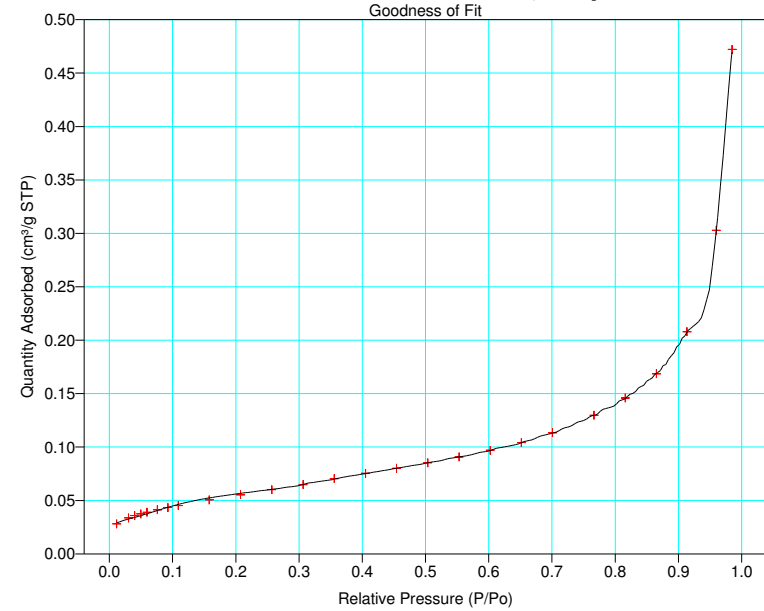
DFT Plus(R) V3.00 (ASAP 2020 V1.05) Unit 1 Page14

Sample: S0.5-1
 Operator:
 Submitter:
 Source File: D:\DATA\2020\EVA\S0.5-1

Started: 2010-10-29 11:05:26 Analysis Adsorptive: N2
 Completed: 2010-10-29 15:48:56 Analysis Bath: 77.429 K
 Report Time: 2010-12-22 11:54:11 Thermal Correction: No
 Sample Mass: 13.2809 g Equil. Interval: 10 s
 Warm Freespace: 22.6921 cm³ Cold Freespace: 66.0676 cm³

Porosity Distribution by Original Density Functional Theory
 Model: N2 @ 77K on Carbon, Slit Pores
 Method: Non-negative Regularization; No Smoothing

Standard Deviation of Fit: 0.00180, cm³/g



A2.14 Pore size distributions (PSD) according to the density functional theory (DFT) (as referenced to in Section 3.2.2) for the HV sample size fraction 1–2 mm

Micromeritics Instrument Corporation
DFT Plus(R) V3.00 (ASAP 2020 V1.05) Unit 1 Page 1

Sample: STONE1
Operator:
Submitter:
Source File: D:\DATA\2020\EVA\STONE1.SMP
Started: 2010-06-30 9:46:22 Analysis Adsorptive: N2
Completed: 2010-06-30 17:43:41 Analysis Bath: 77.454 K
Report Time: 2010-12-22 11:54:40 Thermal Correction: No
Sample Mass: 15.0799 g Equil. Interval: 10 s
Warm Freespace: 22.9868 cm³ Cold Freespace: 69.1966 cm³

Porosity Distribution by Original Density Functional Theory
Model: N2 @ 77K on Carbon, Slit Pores
Method: Non-negative Regularization; No Smoothing

Volume in Pores < 14.83 Å : 0.00003 cm³/g
Total Volume in Pores <= 862.45 Å : 0.00053 cm³/g
Area in Pores > 862.45 Å : 0.036 m²/g
Total Area in Pores >= 14.83 Å : 0.083 m²/g

Pore Size Table

Pore Width (Å)	Cumulative Volume (cm ³ /g)	Incremental Volume (cm ³ /g)	Cumulative Area (m ² /g)	Incremental Area (m ² /g)
14.83	0.00000	0.00000	0.005	0.005
15.91	0.00001	0.00000	0.007	0.002
17.16	0.00001	0.00000	0.007	0.000
18.59	0.00001	0.00000	0.007	0.000
20.02	0.00001	0.00000	0.007	0.000
21.62	0.00001	0.00000	0.007	0.000
23.41	0.00001	0.00000	0.007	0.000
25.20	0.00001	0.00000	0.007	0.000
27.34	0.00001	0.00000	0.007	0.000
29.49	0.00001	0.00000	0.007	0.000
31.81	0.00001	0.00000	0.007	0.000
34.31	0.00001	0.00000	0.007	0.000
36.99	0.00001	0.00000	0.007	0.000
40.03	0.00001	0.00000	0.007	0.000
43.25	0.00001	0.00000	0.007	0.000
46.64	0.00001	0.00000	0.007	0.000
50.40	0.00001	0.00000	0.007	0.000
54.33	0.00001	0.00000	0.007	0.000
58.80	0.00001	0.00000	0.008	0.001
63.44	0.00001	0.00000	0.009	0.001
68.45	0.00001	0.00000	0.010	0.001
73.99	0.00002	0.00000	0.011	0.001
79.88	0.00002	0.00000	0.012	0.001
86.32	0.00003	0.00001	0.014	0.002
93.11	0.00004	0.00001	0.015	0.002
100.61	0.00005	0.00001	0.017	0.001
108.66	0.00005	0.00001	0.018	0.001
117.23	0.00006	0.00001	0.020	0.001
126.53	0.00007	0.00001	0.021	0.001
136.71	0.00008	0.00001	0.022	0.001
147.61	0.00009	0.00001	0.024	0.002
159.41	0.00010	0.00001	0.026	0.002
172.10	0.00012	0.00001	0.027	0.001
185.86	0.00012	0.00001	0.028	0.001

Micromeritics Instrument Corporation
DFT Plus(R) V3.00 (ASAP 2020 V1.05) Unit 1 Page 2

Sample: STONE1
Operator:
Submitter:
Source File: D:\DATA\2020\EVA\STONE1.SMP
Started: 2010-06-30 9:46:22 Analysis Adsorptive: N2
Completed: 2010-06-30 17:43:41 Analysis Bath: 77.454 K
Report Time: 2010-12-22 11:54:40 Thermal Correction: No
Sample Mass: 15.0799 g Equil. Interval: 10 s
Warm Freespace: 22.9868 cm³ Cold Freespace: 69.1966 cm³

Porosity Distribution by Original Density Functional Theory
Model: N2 @ 77K on Carbon, Slit Pores
Method: Non-negative Regularization; No Smoothing

Volume in Pores < 14.83 Å : 0.00003 cm³/g
Total Volume in Pores <= 862.45 Å : 0.00053 cm³/g
Area in Pores > 862.45 Å : 0.036 m²/g
Total Area in Pores >= 14.83 Å : 0.083 m²/g

Pore Size Table

Pore Width (Å)	Cumulative Volume (cm ³ /g)	Incremental Volume (cm ³ /g)	Cumulative Area (m ² /g)	Incremental Area (m ² /g)
200.69	0.00013	0.00000	0.028	0.000
216.60	0.00013	0.00000	0.029	0.000
233.93	0.00014	0.00001	0.029	0.001
252.52	0.00015	0.00001	0.030	0.001
272.71	0.00017	0.00002	0.032	0.001
294.51	0.00019	0.00002	0.033	0.001
317.92	0.00022	0.00002	0.035	0.001
343.30	0.00025	0.00004	0.037	0.002
370.64	0.00029	0.00004	0.039	0.002
400.31	0.00032	0.00003	0.040	0.002
432.30	0.00035	0.00002	0.041	0.001
466.79	0.00037	0.00002	0.042	0.001
503.96	0.00039	0.00003	0.043	0.001
544.17	0.00042	0.00002	0.044	0.001
587.60	0.00043	0.00002	0.045	0.001
634.42	0.00045	0.00001	0.045	0.000
684.99	0.00047	0.00002	0.046	0.001
739.68	0.00048	0.00001	0.046	0.000
798.65	0.00049	0.00001	0.046	0.000
862.45	0.00050	0.00001	0.047	0.000

Micromeritics Instrument Corporation

DFT Plus(R) V3.00 (ASAP 2020 V1.05) Unit 1 Page 3

Sample: STONE1
 Operator:
 Submitter:
 Source File: D:\DATA\2020\EVA\STONE1.SMP

Started: 2010-06-30 9:46:22 Analysis Adsorptive: N2
 Completed: 2010-06-30 17:43:41 Analysis Bath: 77.454 K
 Report Time: 2010-12-22 11:54:40 Thermal Correction: No
 Sample Mass: 15.0799 g Equil. Interval: 10 s
 Warm Freespace: 22.9868 cm³ Cold Freespace: 69.1966 cm³

Porosity Distribution by Original Density Functional Theory
 Model: N2 @ 77K on Carbon, Slit Pores
 Method: Non-negative Regularization; No Smoothing

Standard Deviation of Fit: 0.00187, cm³/g

Isotherm Table

Relative Pressure	Experimental Quantity Adsorbed (cm ³ /g STP)	Fitted Quantity Adsorbed (cm ³ /g STP)	Absolute Residual (cm ³ /g STP)	Relative Residual
0.011783670	0.0392	0.0398	-0.0006	-0.016112
0.014515520	0.0400	0.0403	-0.0003	-0.006320
0.017706521	0.0410	0.0417	-0.0007	-0.017374
0.021398440	0.0421	0.0423	-0.0002	-0.004268
0.025631230	0.0432	0.0428	0.0004	0.008674
0.030442240	0.0442	0.0438	0.0004	0.009489
0.035865448	0.0452	0.0444	0.0008	0.017671
0.041930798	0.0462	0.0451	0.0011	0.024207
0.048663601	0.0472	0.0458	0.0014	0.029828
0.056084011	0.0482	0.0466	0.0016	0.032965
0.064206667	0.0490	0.0475	0.0016	0.031930
0.073040441	0.0499	0.0485	0.0014	0.028354
0.082588248	0.0507	0.0495	0.0012	0.023653
0.092847057	0.0516	0.0506	0.0009	0.018039
0.103808001	0.0523	0.0517	0.0005	0.010412
0.115456402	0.0529	0.0528	0.0001	0.001702
0.127772301	0.0534	0.0538	-0.0003	-0.005985
0.140730694	0.0540	0.0547	-0.0006	-0.011940
0.154301897	0.0547	0.0555	-0.0009	-0.015608
0.168452203	0.0554	0.0564	-0.0009	-0.016698
0.183144197	0.0562	0.0571	-0.0009	-0.016232
0.198337302	0.0570	0.0579	-0.0009	-0.014908
0.213988706	0.0578	0.0586	-0.0008	-0.013367
0.230053306	0.0586	0.0593	-0.0007	-0.011645
0.246484801	0.0595	0.0600	-0.0006	-0.009650
0.263235897	0.0603	0.0608	-0.0004	-0.007344
0.280259013	0.0612	0.0615	-0.0003	-0.004951
0.297506303	0.0621	0.0623	-0.0002	-0.002722
0.314930797	0.0630	0.0631	0.0000	-0.000772
0.332486212	0.0640	0.0639	0.0001	0.001056
0.350127310	0.0649	0.0648	0.0001	0.002138
0.367810607	0.0659	0.0657	0.0001	0.001701
0.385494202	0.0667	0.0667	0.0000	-0.000256
0.403138310	0.0676	0.0677	-0.0002	-0.002433
0.420704991	0.0685	0.0687	-0.0003	-0.004114
0.438158900	0.0694	0.0698	-0.0004	-0.005505
0.455466807	0.0703	0.0708	-0.0004	-0.006303

Micromeritics Instrument Corporation

DFT Plus(R) V3.00 (ASAP 2020 V1.05) Unit 1 Page 4

Sample: STONE1
 Operator:
 Submitter:
 Source File: D:\DATA\2020\EVA\STONE1.SMP

Started: 2010-06-30 9:46:22 Analysis Adsorptive: N2
 Completed: 2010-06-30 17:43:41 Analysis Bath: 77.454 K
 Report Time: 2010-12-22 11:54:40 Thermal Correction: No
 Sample Mass: 15.0799 g Equil. Interval: 10 s
 Warm Freespace: 22.9868 cm³ Cold Freespace: 69.1966 cm³

Porosity Distribution by Original Density Functional Theory
 Model: N2 @ 77K on Carbon, Slit Pores
 Method: Non-negative Regularization; No Smoothing

Standard Deviation of Fit: 0.00187, cm³/g

Isotherm Table

Relative Pressure	Experimental Quantity Adsorbed (cm ³ /g STP)	Fitted Quantity Adsorbed (cm ³ /g STP)	Absolute Residual (cm ³ /g STP)	Relative Residual
0.472598106	0.0713	0.0717	-0.0005	-0.006502
0.489524394	0.0722	0.0727	-0.0005	-0.006258
0.506219923	0.0732	0.0736	-0.0004	-0.005684
0.522661209	0.0741	0.0745	-0.0004	-0.004822
0.5388827300	0.0751	0.0754	-0.0003	-0.003820
0.554699600	0.0760	0.0762	-0.0002	-0.002884
0.570261598	0.0769	0.0771	-0.0001	-0.001785
0.585499227	0.0779	0.0779	0.0000	-0.000531
0.600400090	0.0789	0.0788	0.0000	0.000580
0.614954293	0.0799	0.0801	-0.0002	-0.002545
0.629153311	0.0811	0.0810	0.0000	0.000492
0.642990828	0.0823	0.0820	0.0003	0.003811
0.656461716	0.0835	0.0836	-0.0001	-0.001319
0.669562697	0.0849	0.0846	0.0002	0.002747
0.682291925	0.0863	0.0867	-0.0004	-0.004729
0.694648683	0.0878	0.0878	0.0000	0.000402
0.706633508	0.0893	0.0888	0.0005	0.005439
0.718248010	0.0909	0.0912	-0.0003	-0.003491
0.729494929	0.0927	0.0923	0.0004	0.004471
0.740377605	0.0945	0.0949	-0.0004	-0.004387
0.750900388	0.0963	0.0958	0.0005	0.005169
0.761068285	0.0982	0.0987	-0.0005	-0.004779
0.770887017	0.1002	0.0996	0.0005	0.005425
0.780362606	0.1024	0.1039	-0.0015	-0.014967
0.789501607	0.1048	0.1048	0.0000	-0.000059
0.798311174	0.1073	0.1057	0.0016	0.015043
0.806798697	0.1098	0.1106	-0.0007	-0.006807
0.814971626	0.1123	0.1115	0.0008	0.007167
0.822837889	0.1148	0.1157	-0.0009	-0.007692
0.830405474	0.1176	0.1166	0.0009	0.007942
0.837682605	0.1205	0.1215	-0.0010	-0.008055
0.844677329	0.1235	0.1224	0.0010	0.008224
0.851397991	0.1264	0.1273	-0.0009	-0.007381
0.857852995	0.1293	0.1283	0.0010	0.007523
0.864050388	0.1320	0.1330	-0.0010	-0.007289
0.869998574	0.1349	0.1339	0.0010	0.007396
0.875705481	0.1383	0.1398	-0.0014	-0.010330

Micromeritics Instrument Corporation

DFT Plus(R) V3.00 (ASAP 2020 V1.05)

Unit 1

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Sample: STONE1
 Operator:
 Submitter:
 Source File: D:\DATA\2020\EVA\STONE1.SMP

Started: 2010-06-30 9:46:22 Analysis Adsorptive: N2
 Completed: 2010-06-30 17:43:41 Analysis Bath: 77.454 K
 Report Time: 2010-12-22 11:54:40 Thermal Correction: No
 Sample Mass: 15.0799 g Equil. Interval: 10 s
 Warm Freespace: 22.9868 cm³ Cold Freespace: 69.1966 cm³

Porosity Distribution by Original Density Functional Theory
 Model: N2 @ 77K on Carbon, Slit Pores
 Method: Non-negative Regularization; No Smoothing

Standard Deviation of Fit: 0.00187, cm³/g

Isotherm Table

Relative Pressure	Experimental Quantity Adsorbed (cm ³ /g STP)	Fitted Quantity Adsorbed (cm ³ /g STP)	Absolute Residual (cm ³ /g STP)	Relative Residual
0.881179392	0.1421	0.1406	0.0015	0.010284
0.886428118	0.1461	0.1477	-0.0016	-0.010976
0.891459525	0.1501	0.1485	0.0016	0.010872
0.896281302	0.1542	0.1558	-0.0016	-0.010194
0.900900900	0.1582	0.1566	0.0016	0.010098
0.905325770	0.1621	0.1635	-0.0014	-0.008683
0.909563184	0.1658	0.1643	0.0014	0.008626
0.913620114	0.1692	0.1701	-0.0009	-0.005160
0.917503417	0.1719	0.1710	0.0009	0.005190
0.921219707	0.1738	0.1741	-0.0003	-0.001903
0.924775481	0.1754	0.1750	0.0003	0.001975
0.928177178	0.1771	0.1777	-0.0006	-0.003440
0.931430817	0.1792	0.1786	0.0006	0.003481
0.934542298	0.1820	0.1833	-0.0013	-0.007408
0.937517405	0.1855	0.1842	0.0014	0.007343
0.940361619	0.1900	0.1923	-0.0023	-0.012045
0.943080306	0.1954	0.1931	0.0023	0.011786
0.945678592	0.2018	0.2051	-0.0033	-0.016172
0.948161721	0.2092	0.2059	0.0033	0.015673
0.950534225	0.2174	0.2174	0.0000	0.000036
0.952800930	0.2266	0.2312	-0.0046	-0.020218
0.954966187	0.2367	0.2321	0.0046	0.019421
0.957034409	0.2475	0.2528	-0.0053	-0.021458
0.959009588	0.2590	0.2536	0.0053	0.020558
0.960896015	0.2706	0.2758	-0.0051	-0.019012
0.962697208	0.2818	0.2766	0.0052	0.018303
0.964416981	0.2924	0.2971	-0.0047	-0.016022
0.966058910	0.3025	0.2979	0.0047	0.015516
0.967626274	0.3122	0.3122	0.0000	0.000008
0.969122529	0.3215	0.3255	-0.0040	-0.012595
0.970550597	0.3303	0.3263	0.0041	0.012278
0.971913695	0.3387	0.3424	-0.0036	-0.010764
0.973214507	0.3468	0.3431	0.0037	0.010531
0.974455774	0.3545	0.3577	-0.0033	-0.009202
0.975640416	0.3618	0.3585	0.0033	0.009029
0.976770699	0.3688	0.3688	0.0000	0.000002
0.977849126	0.3755	0.3782	-0.0028	-0.007393

Micromeritics Instrument Corporation

DFT Plus(R) V3.00 (ASAP 2020 V1.05)

Unit 1

Page 6

Sample: STONE1
 Operator:
 Submitter:
 Source File: D:\DATA\2020\EVA\STONE1.SMP

Started: 2010-06-30 9:46:22 Analysis Adsorptive: N2
 Completed: 2010-06-30 17:43:41 Analysis Bath: 77.454 K
 Report Time: 2010-12-22 11:54:40 Thermal Correction: No
 Sample Mass: 15.0799 g Equil. Interval: 10 s
 Warm Freespace: 22.9868 cm³ Cold Freespace: 69.1966 cm³

Porosity Distribution by Original Density Functional Theory
 Model: N2 @ 77K on Carbon, Slit Pores
 Method: Non-negative Regularization; No Smoothing

Standard Deviation of Fit: 0.00187, cm³/g

Isotherm Table

Relative Pressure	Experimental Quantity Adsorbed (cm ³ /g STP)	Fitted Quantity Adsorbed (cm ³ /g STP)	Absolute Residual (cm ³ /g STP)	Relative Residual
0.978878021	0.3818	0.3790	0.0028	0.007279
0.979859591	0.3879	0.3904	-0.0025	-0.006477
0.980795979	0.3937	0.3912	0.0025	0.006388
0.981689274	0.3992	0.3992	0.0000	0.000001
0.982541502	0.4045	0.4066	-0.0021	-0.005274
0.983354270	0.4095	0.4074	0.0021	0.005213
0.984129488	0.4143	0.4162	-0.0019	-0.004528
0.984869003	0.4189	0.4170	0.0019	0.004482

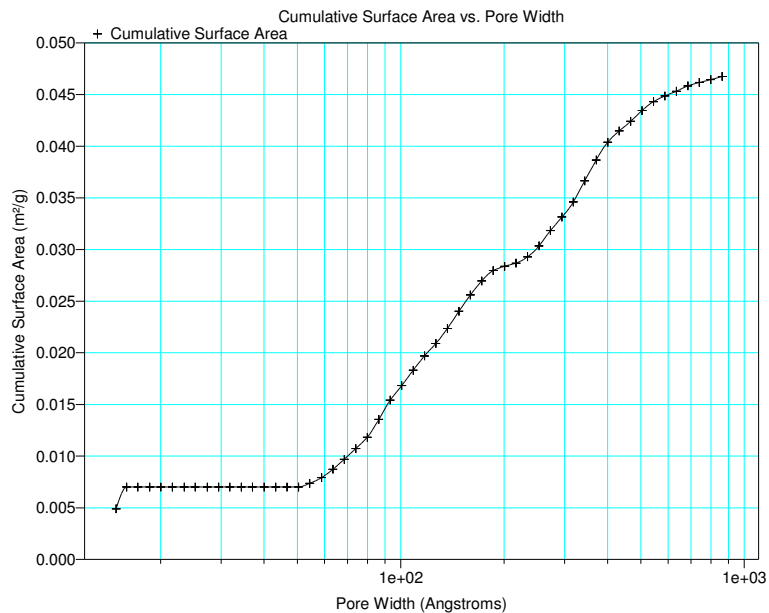
Micromeritics Instrument Corporation

DFT Plus(R) V3.00 (ASAP 2020 V1.05) Unit 1 Page 7

Sample: STONE1
 Operator:
 Submitter:
 Source File: D:\DATA\2020\EVA\STONE1.SMP
 Started: 2010-06-30 9:46:22 Analysis Adsorptive: N2
 Completed: 2010-06-30 17:43:41 Analysis Bath: 77.454 K
 Report Time: 2010-12-22 11:54:41 Thermal Correction: No
 Sample Mass: 15.0799 g Equil. Interval: 10 s
 Warm Freespace: 22.9868 cm³ Cold Freespace: 69.1966 cm³

Porosity Distribution by Original Density Functional Theory
 Model: N2 @ 77K on Carbon, Slit Pores
 Method: Non-negative Regularization; No Smoothing

Volume in Pores <	14.83 Å	:	0.00003 cm ³ /g
Total Volume in Pores <=	862.45 Å	:	0.00053 cm ³ /g
Area in Pores >	862.45 Å	:	0.036 m ² /g
Total Area in Pores >=	14.83 Å	:	0.083 m ² /g



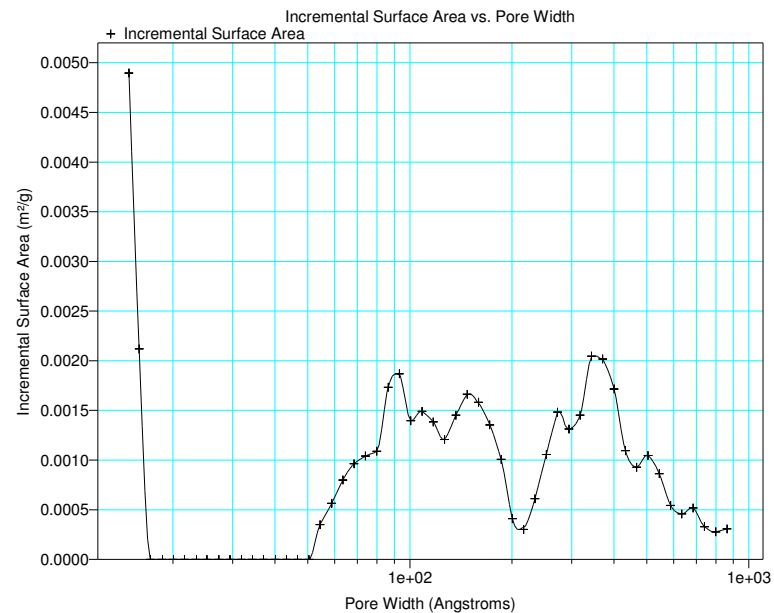
Micromeritics Instrument Corporation

DFT Plus(R) V3.00 (ASAP 2020 V1.05) Unit 1 Page 8

Sample: STONE1
 Operator:
 Submitter:
 Source File: D:\DATA\2020\EVA\STONE1.SMP
 Started: 2010-06-30 9:46:22 Analysis Adsorptive: N2
 Completed: 2010-06-30 17:43:41 Analysis Bath: 77.454 K
 Report Time: 2010-12-22 11:54:41 Thermal Correction: No
 Sample Mass: 15.0799 g Equil. Interval: 10 s
 Warm Freespace: 22.9868 cm³ Cold Freespace: 69.1966 cm³

Porosity Distribution by Original Density Functional Theory
 Model: N2 @ 77K on Carbon, Slit Pores
 Method: Non-negative Regularization; No Smoothing

Volume in Pores <	14.83 Å	:	0.00003 cm ³ /g
Total Volume in Pores <=	862.45 Å	:	0.00053 cm ³ /g
Area in Pores >	862.45 Å	:	0.036 m ² /g
Total Area in Pores >=	14.83 Å	:	0.083 m ² /g



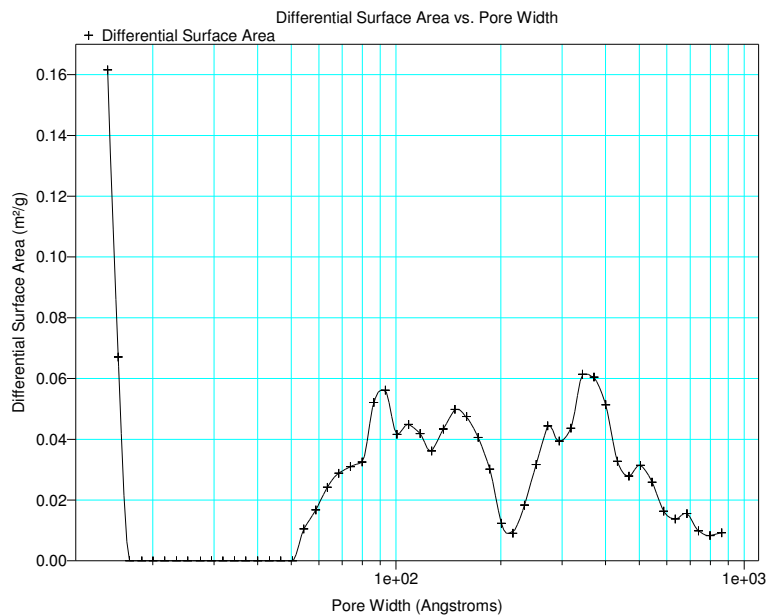
Micromeritics Instrument Corporation

DFT Plus(R) V3.00 (ASAP 2020 V1.05) Unit 1 Page 9

Sample: STONE1
 Operator:
 Submitter:
 Source File: D:\DATA\2020\EVA\STONE1.SMP
 Started: 2010-06-30 9:46:22 Analysis Adsorptive: N2
 Completed: 2010-06-30 17:43:41 Analysis Bath: 77.454 K
 Report Time: 2010-12-22 11:54:41 Thermal Correction: No
 Sample Mass: 15.0799 g Equil. Interval: 10 s
 Warm Freespace: 22.9868 cm³ Cold Freespace: 69.1966 cm³

Porosity Distribution by Original Density Functional Theory
 Model: N2 @ 77K on Carbon, Slit Pores
 Method: Non-negative Regularization; No Smoothing

Volume in Pores <	14.83 Å	:	0.00003 cm ³ /g
Total Volume in Pores <=	862.45 Å	:	0.00053 cm ³ /g
Area in Pores >	862.45 Å	:	0.036 m ² /g
Total Area in Pores >=	14.83 Å	:	0.083 m ² /g



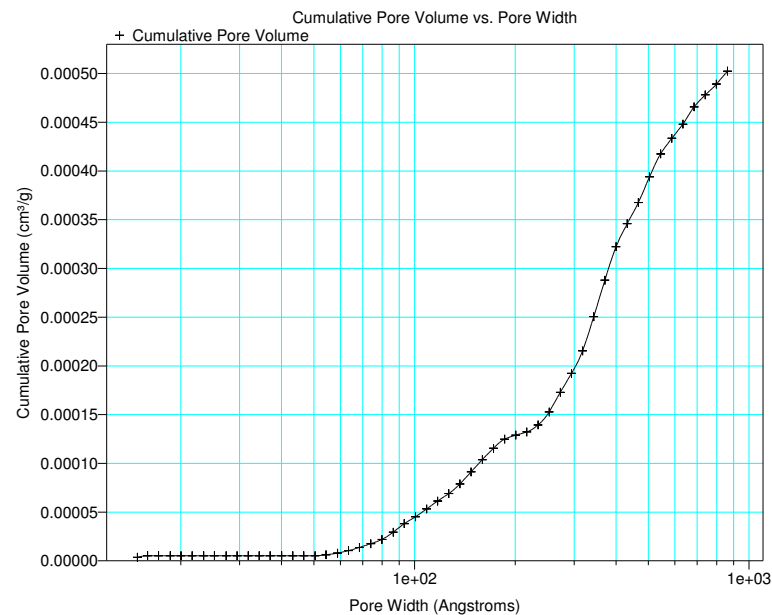
Micromeritics Instrument Corporation

DFT Plus(R) V3.00 (ASAP 2020 V1.05) Unit 1 Page10

Sample: STONE1
 Operator:
 Submitter:
 Source File: D:\DATA\2020\EVA\STONE1.SMP
 Started: 2010-06-30 9:46:22 Analysis Adsorptive: N2
 Completed: 2010-06-30 17:43:41 Analysis Bath: 77.454 K
 Report Time: 2010-12-22 11:54:41 Thermal Correction: No
 Sample Mass: 15.0799 g Equil. Interval: 10 s
 Warm Freespace: 22.9868 cm³ Cold Freespace: 69.1966 cm³

Porosity Distribution by Original Density Functional Theory
 Model: N2 @ 77K on Carbon, Slit Pores
 Method: Non-negative Regularization; No Smoothing

Volume in Pores <	14.83 Å	:	0.00003 cm ³ /g
Total Volume in Pores <=	862.45 Å	:	0.00053 cm ³ /g
Area in Pores >	862.45 Å	:	0.036 m ² /g
Total Area in Pores >=	14.83 Å	:	0.083 m ² /g



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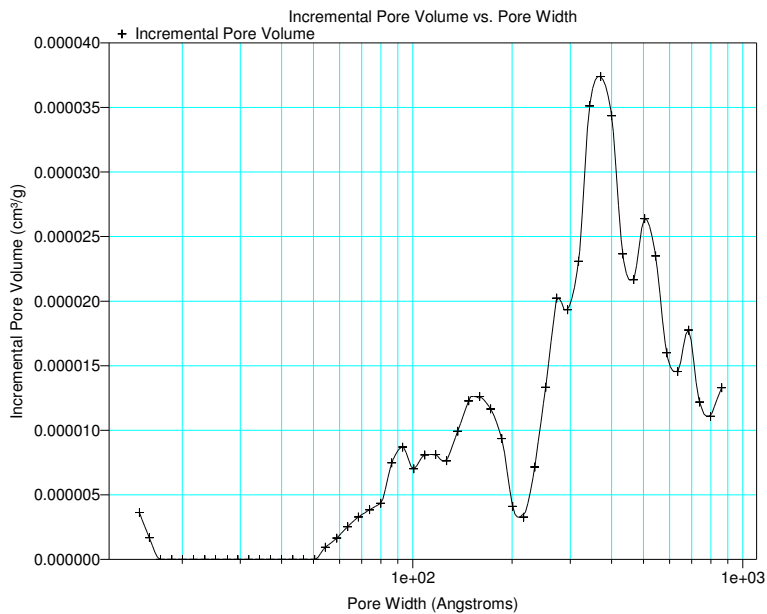
DFT Plus(R) V3.00 (ASAP 2020 V1.05) Unit 1 Page11

Sample: STONE1
 Operator:
 Submitter:
 Source File: D:\DATA\2020\EVA\STONE1.SMP

Started: 2010-06-30 9:46:22 Analysis Adsorptive: N2
 Completed: 2010-06-30 17:43:41 Analysis Bath: 77.454 K
 Report Time: 2010-12-22 11:54:41 Thermal Correction: No
 Sample Mass: 15.0799 g Equil. Interval: 10 s
 Warm Freespace: 22.9868 cm³ Cold Freespace: 69.1966 cm³

Porosity Distribution by Original Density Functional Theory
 Model: N2 @ 77K on Carbon, Slit Pores
 Method: Non-negative Regularization; No Smoothing

Volume in Pores <	14.83 Å	:	0.00003 cm ³ /g
Total Volume in Pores <=	862.45 Å	:	0.00053 cm ³ /g
Area in Pores >	862.45 Å	:	0.036 m ² /g
Total Area in Pores >=	14.83 Å	:	0.083 m ² /g



Micromeritics Instrument Corporation

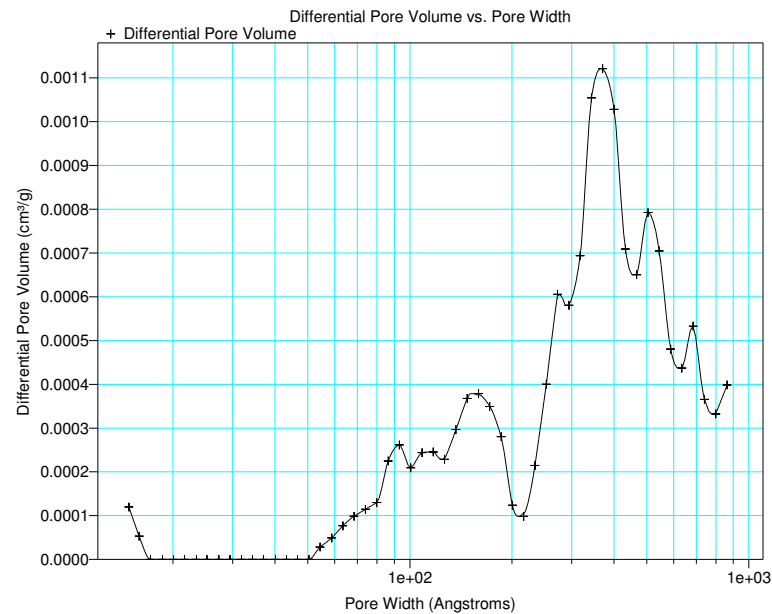
DFT Plus(R) V3.00 (ASAP 2020 V1.05) Unit 1 Page12

Sample: STONE1
 Operator:
 Submitter:
 Source File: D:\DATA\2020\EVA\STONE1.SMP

Started: 2010-06-30 9:46:22 Analysis Adsorptive: N2
 Completed: 2010-06-30 17:43:41 Analysis Bath: 77.454 K
 Report Time: 2010-12-22 11:54:41 Thermal Correction: No
 Sample Mass: 15.0799 g Equil. Interval: 10 s
 Warm Freespace: 22.9868 cm³ Cold Freespace: 69.1966 cm³

Porosity Distribution by Original Density Functional Theory
 Model: N2 @ 77K on Carbon, Slit Pores
 Method: Non-negative Regularization; No Smoothing

Volume in Pores <	14.83 Å	:	0.00003 cm ³ /g
Total Volume in Pores <=	862.45 Å	:	0.00053 cm ³ /g
Area in Pores >	862.45 Å	:	0.036 m ² /g
Total Area in Pores >=	14.83 Å	:	0.083 m ² /g



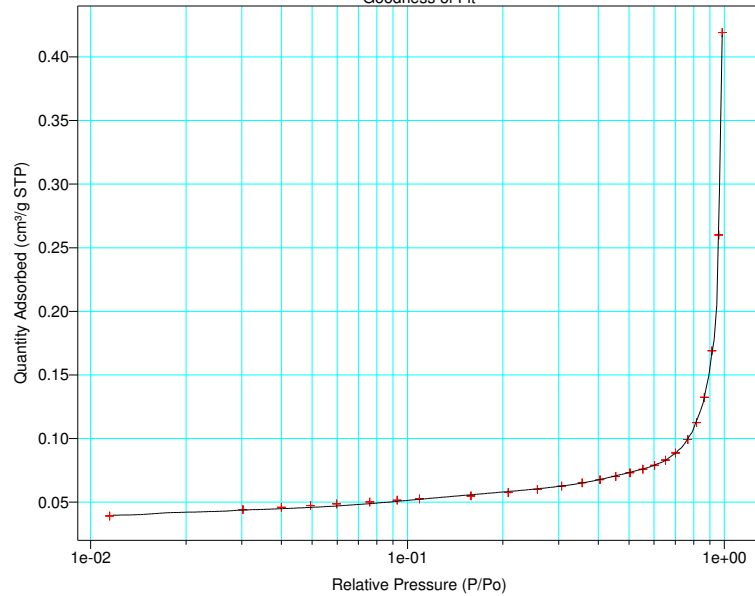
Micromeritics Instrument Corporation

DFT Plus(R) V3.00 (ASAP 2020 V1.05) Unit 1 Page13

Sample: STONE1
Operator:
Submitter:
Source File: D:\DATA\2020\EVA\STONE1.SMP
Started: 2010-06-30 9:46:22 Analysis Adsorptive: N2
Completed: 2010-06-30 17:43:41 Analysis Bath: 77.454 K
Report Time: 2010-12-22 11:54:41 Thermal Correction: No
Sample Mass: 15.0799 g Equil. Interval: 10 s
Warm Freespace: 22.9868 cm³ Cold Freespace: 69.1966 cm³

Porosity Distribution by Original Density Functional Theory
Model: N2 @ 77K on Carbon, Slit Pores
Method: Non-negative Regularization; No Smoothing

Standard Deviation of Fit: 0.00187, cm³/g
Goodness of Fit



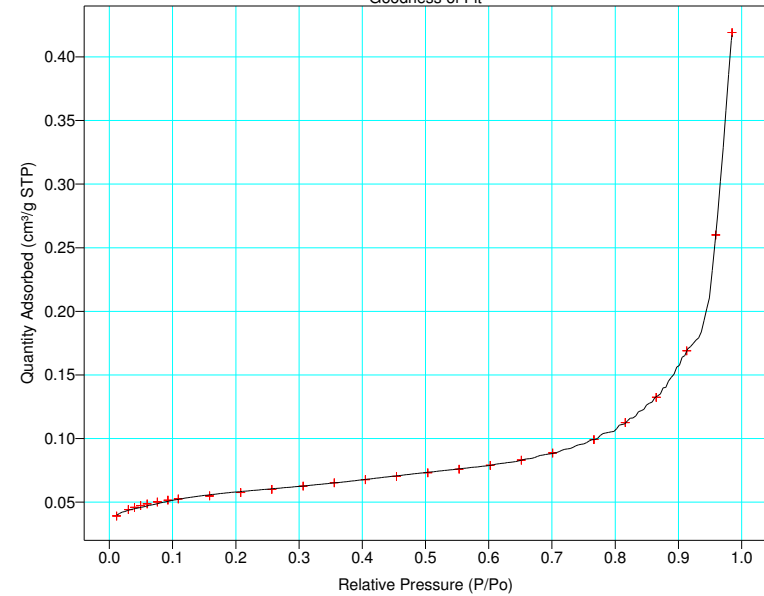
Micromeritics Instrument Corporation

DFT Plus(R) V3.00 (ASAP 2020 V1.05) Unit 1 Page14

Sample: STONE1
Operator:
Submitter:
Source File: D:\DATA\2020\EVA\STONE1.SMP
Started: 2010-06-30 9:46:22 Analysis Adsorptive: N2
Completed: 2010-06-30 17:43:41 Analysis Bath: 77.454 K
Report Time: 2010-12-22 11:54:41 Thermal Correction: No
Sample Mass: 15.0799 g Equil. Interval: 10 s
Warm Freespace: 22.9868 cm³ Cold Freespace: 69.1966 cm³

Porosity Distribution by Original Density Functional Theory
Model: N2 @ 77K on Carbon, Slit Pores
Method: Non-negative Regularization; No Smoothing

Standard Deviation of Fit: 0.00187, cm³/g
Goodness of Fit



A2.15 Pore size distributions (PSD) according to the density functional theory (DFT) (as referenced to in Section 3.2.2) for the HV sample size fraction 2–3 mm

Micromeritics Instrument Corporation
 DFT Plus(R) V3.00 (ASAP 2020 V1.05) Unit 1 Page 1
 Sample: STONE5_2
 Operator:
 Submitter:
 Source File: D:\DATA\2020\EVA\STONE5_2.SMP
 Started: 2010-08-19 9:30:17 Analysis Adsorptive: N2
 Completed: 2010-08-19 14:59:06 Analysis Bath: 77.434 K
 Report Time: 2010-12-22 11:55:55 Thermal Correction: No
 Sample Mass: 13.4041 g Equil. Interval: 10 s
 Warm Freespace: 22.5588 cm³ Cold Freespace: 65.2999 cm³

Porosity Distribution by Original Density Functional Theory
 Model: N2 @ 77K on Carbon, Slit Pores
 Method: Non-negative Regularization; No Smoothing

Volume in Pores < 14.83 Å : 0.00001 cm³/g
 Total Volume in Pores <= 862.45 Å : 0.00042 cm³/g
 Area in Pores > 862.45 Å : 0.104 m²/g
 Total Area in Pores >= 14.83 Å : 0.135 m²/g

Pore Size Table

Pore Width (Å)	Cumulative Volume (cm ³ /g)	Incremental Volume (cm ³ /g)	Cumulative Area (m ² /g)	Incremental Area (m ² /g)
14.83	0.00000	0.00000	0.000	0.000
15.91	0.00000	0.00000	0.000	0.000
17.16	0.00000	0.00000	0.000	0.000
18.59	0.00000	0.00000	0.000	0.000
20.02	0.00000	0.00000	0.000	0.000
21.62	0.00000	0.00000	0.000	0.000
23.41	0.00000	0.00000	0.000	0.000
25.20	0.00000	0.00000	0.000	0.000
27.34	0.00000	0.00000	0.000	0.000
29.49	0.00000	0.00000	0.000	0.000
31.81	0.00000	0.00000	0.001	0.001
34.31	0.00000	0.00000	0.001	0.000
36.99	0.00000	0.00000	0.001	0.000
40.03	0.00000	0.00000	0.001	0.000
43.25	0.00000	0.00000	0.001	0.000
46.64	0.00000	0.00000	0.001	0.000
50.40	0.00000	0.00000	0.001	0.000
54.33	0.00000	0.00000	0.002	0.000
58.80	0.00000	0.00000	0.002	0.000
63.44	0.00000	0.00000	0.002	0.000
68.45	0.00001	0.00000	0.003	0.000
73.99	0.00001	0.00000	0.003	0.001
79.88	0.00001	0.00000	0.004	0.001
86.32	0.00002	0.00000	0.005	0.001
93.11	0.00002	0.00001	0.006	0.001
100.61	0.00003	0.00000	0.007	0.001
108.66	0.00003	0.00001	0.008	0.001
117.23	0.00004	0.00001	0.009	0.001
126.53	0.00004	0.00001	0.010	0.001
136.71	0.00005	0.00001	0.011	0.001
147.61	0.00006	0.00001	0.012	0.001
159.41	0.00007	0.00001	0.014	0.001
172.10	0.00008	0.00001	0.015	0.001
185.86	0.00008	0.00001	0.015	0.001

Micromeritics Instrument Corporation
 DFT Plus(R) V3.00 (ASAP 2020 V1.05) Unit 1 Page 2
 Sample: STONE5_2
 Operator:
 Submitter:
 Source File: D:\DATA\2020\EVA\STONE5_2.SMP
 Started: 2010-08-19 9:30:17 Analysis Adsorptive: N2
 Completed: 2010-08-19 14:59:06 Analysis Bath: 77.434 K
 Report Time: 2010-12-22 11:55:55 Thermal Correction: No
 Sample Mass: 13.4041 g Equil. Interval: 10 s
 Warm Freespace: 22.5588 cm³ Cold Freespace: 65.2999 cm³

Porosity Distribution by Original Density Functional Theory
 Model: N2 @ 77K on Carbon, Slit Pores
 Method: Non-negative Regularization; No Smoothing

Volume in Pores < 14.83 Å : 0.00001 cm³/g
 Total Volume in Pores <= 862.45 Å : 0.00042 cm³/g
 Area in Pores > 862.45 Å : 0.104 m²/g
 Total Area in Pores >= 14.83 Å : 0.135 m²/g

Pore Size Table

Pore Width (Å)	Cumulative Volume (cm ³ /g)	Incremental Volume (cm ³ /g)	Cumulative Area (m ² /g)	Incremental Area (m ² /g)
200.69	0.00008	0.00000	0.015	0.000
216.60	0.00008	0.00000	0.015	0.000
233.93	0.00008	0.00000	0.015	0.000
252.52	0.00009	0.00001	0.016	0.001
272.71	0.00011	0.00002	0.017	0.001
294.51	0.00013	0.00002	0.018	0.001
317.92	0.00015	0.00002	0.020	0.001
343.30	0.00018	0.00003	0.022	0.002
370.64	0.00022	0.00004	0.024	0.002
400.31	0.00025	0.00003	0.025	0.002
432.30	0.00027	0.00002	0.026	0.001
466.79	0.00029	0.00002	0.027	0.001
503.96	0.00032	0.00002	0.028	0.001
544.17	0.00034	0.00002	0.029	0.001
587.60	0.00035	0.00001	0.029	0.000
634.42	0.00037	0.00001	0.030	0.000
684.99	0.00038	0.00001	0.030	0.000
739.68	0.00039	0.00001	0.030	0.000
798.65	0.00040	0.00001	0.031	0.000
862.45	0.00041	0.00001	0.031	0.000

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DFT Plus(R) V3.00 (ASAP 2020 V1.05) Unit 1 Page 3

Sample: STONE5_2
 Operator:
 Submitter:
 Source File: D:\DATA\2020\EVA\STONE5_2.SMP

Started: 2010-08-19 9:30:17 Analysis Adsorptive: N2
 Completed: 2010-08-19 14:59:06 Analysis Bath: 77.434 K
 Report Time: 2010-12-22 11:55:55 Thermal Correction: No
 Sample Mass: 13.4041 g Equil. Interval: 10 s
 Warm Freespace: 22.5588 cm³ Cold Freespace: 65.2999 cm³

Porosity Distribution by Original Density Functional Theory
 Model: N2 @ 77K on Carbon, Slit Pores
 Method: Non-negative Regularization; No Smoothing

Standard Deviation of Fit: 0.00172, cm³/g

Isotherm Table

Relative Pressure	Experimental Quantity Adsorbed (cm ³ /g STP)	Fitted Quantity Adsorbed (cm ³ /g STP)	Absolute Residual (cm ³ /g STP)	Relative Residual
0.011783670	0.0397	0.0405	-0.0008	-0.019891
0.014515520	0.0407	0.0412	-0.0005	-0.011919
0.017706521	0.0418	0.0419	-0.0001	-0.002804
0.021398440	0.0431	0.0427	0.0004	0.008917
0.025631230	0.0443	0.0434	0.0009	0.020073
0.030442240	0.0456	0.0443	0.0013	0.028084
0.035865448	0.0467	0.0452	0.0015	0.032966
0.041930798	0.0479	0.0462	0.0017	0.035865
0.048663601	0.0492	0.0473	0.0018	0.037488
0.056084011	0.0505	0.0486	0.0019	0.037002
0.064206667	0.0518	0.0501	0.0017	0.031892
0.073040441	0.0530	0.0518	0.0012	0.023002
0.082588248	0.0542	0.0536	0.0007	0.012237
0.092847057	0.0555	0.0554	0.0001	0.001909
0.103808001	0.0569	0.0573	-0.0004	-0.006490
0.115456402	0.0582	0.0591	-0.0008	-0.014073
0.127772301	0.0595	0.0607	-0.0012	-0.020231
0.140730694	0.0608	0.0623	-0.0015	-0.024550
0.154301897	0.0621	0.0638	-0.0017	-0.026936
0.168452203	0.0634	0.0651	-0.0017	-0.027298
0.183144197	0.0648	0.0665	-0.0017	-0.025919
0.198337302	0.0662	0.0677	-0.0015	-0.023160
0.213988706	0.0677	0.0690	-0.0013	-0.019340
0.230053306	0.0692	0.0702	-0.0010	-0.014892
0.246484801	0.0707	0.0714	-0.0007	-0.010158
0.263235897	0.0723	0.0727	-0.0004	-0.005415
0.280259013	0.0739	0.0740	-0.0001	-0.000928
0.297506303	0.0755	0.0753	0.0002	0.003058
0.314930797	0.0772	0.0772	0.0000	-0.000473
0.332486212	0.0788	0.0786	0.0002	0.001916
0.350127310	0.0805	0.0802	0.0003	0.003453
0.367810607	0.0821	0.0818	0.0004	0.004314
0.385494202	0.0838	0.0835	0.0004	0.004328
0.403138310	0.0855	0.0852	0.0003	0.003641
0.420704991	0.0872	0.0870	0.0002	0.002565
0.438158900	0.0889	0.0888	0.0001	0.001460
0.455466807	0.0906	0.0905	0.0001	0.000560

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DFT Plus(R) V3.00 (ASAP 2020 V1.05) Unit 1 Page 4

Sample: STONE5_2
 Operator:
 Submitter:
 Source File: D:\DATA\2020\EVA\STONE5_2.SMP

Started: 2010-08-19 9:30:17 Analysis Adsorptive: N2
 Completed: 2010-08-19 14:59:06 Analysis Bath: 77.434 K
 Report Time: 2010-12-22 11:55:55 Thermal Correction: No
 Sample Mass: 13.4041 g Equil. Interval: 10 s
 Warm Freespace: 22.5588 cm³ Cold Freespace: 65.2999 cm³

Porosity Distribution by Original Density Functional Theory
 Model: N2 @ 77K on Carbon, Slit Pores
 Method: Non-negative Regularization; No Smoothing

Standard Deviation of Fit: 0.00172, cm³/g

Isotherm Table

Relative Pressure	Experimental Quantity Adsorbed (cm ³ /g STP)	Fitted Quantity Adsorbed (cm ³ /g STP)	Absolute Residual (cm ³ /g STP)	Relative Residual
0.472598106	0.0922	0.0922	0.0000	-0.000453
0.489524394	0.0937	0.0938	-0.0001	-0.001426
0.506219923	0.0953	0.0954	-0.0002	-0.001868
0.522661209	0.0968	0.0970	-0.0002	-0.001686
0.538827300	0.0984	0.0985	-0.0001	-0.001208
0.554699600	0.0999	0.1000	-0.0001	-0.000744
0.570261598	0.1015	0.1015	0.0000	-0.000060
0.585499227	0.1031	0.1031	0.0000	0.000074
0.600400090	0.1047	0.1046	0.0001	0.001057
0.614954293	0.1064	0.1066	-0.0002	-0.001686
0.629153311	0.1082	0.1082	0.0000	0.000384
0.642990828	0.1101	0.1099	0.0002	0.002256
0.656461716	0.1120	0.1120	0.0000	-0.000187
0.669562697	0.1139	0.1138	0.0001	0.000974
0.682291925	0.1158	0.1159	-0.0001	-0.000653
0.694648683	0.1178	0.1177	0.0000	0.000252
0.706633508	0.1197	0.1196	0.0001	0.001050
0.718248010	0.1218	0.1219	-0.0001	-0.001198
0.729494929	0.1239	0.1237	0.0002	0.001753
0.740377605	0.1261	0.1264	-0.0002	-0.001805
0.750900388	0.1284	0.1281	0.0003	0.002255
0.761068285	0.1306	0.1308	-0.0003	-0.001977
0.770887017	0.1328	0.1325	0.0003	0.002356
0.780362606	0.1353	0.1363	-0.0010	-0.007705
0.789501607	0.1379	0.1379	0.0000	-0.000046
0.798311174	0.1407	0.1396	0.0011	0.007848
0.806798693	0.1435	0.1439	-0.0005	-0.003328
0.814971626	0.1462	0.1457	0.0005	0.003557
0.822837889	0.1490	0.1496	-0.0006	-0.004134
0.830405474	0.1521	0.1514	0.0007	0.004299
0.837682605	0.1553	0.1560	-0.0007	-0.004430
0.844677329	0.1586	0.1579	0.0007	0.004549
0.851397991	0.1619	0.1625	-0.0006	-0.003912
0.857852995	0.1650	0.1644	0.0007	0.004015
0.864050388	0.1681	0.1687	-0.0007	-0.003916
0.869998574	0.1712	0.1706	0.0007	0.003999
0.875705481	0.1749	0.1760	-0.0011	-0.006309

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DFT Plus(R) V3.00 (ASAP 2020 V1.05) Unit 1 Page 5

Sample: STONE5_2
 Operator:
 Submitter:
 Source File: D:\DATA\2020\EVA\STONE5_2.SMP

Started: 2010-08-19 9:30:17 Analysis Adsorptive: N2
 Completed: 2010-08-19 14:59:06 Analysis Bath: 77.434 K
 Report Time: 2010-12-22 11:55:55 Thermal Correction: No
 Sample Mass: 13.4041 g Equil. Interval: 10 s
 Warm Freespace: 22.5588 cm³ Cold Freespace: 65.2999 cm³

Porosity Distribution by Original Density Functional Theory
 Model: N2 @ 77K on Carbon, Slit Pores
 Method: Non-negative Regularization; No Smoothing

Standard Deviation of Fit: 0.00172, cm³/g

Isotherm Table

Relative Pressure	Experimental Quantity Adsorbed (cm ³ /g STP)	Fitted Quantity Adsorbed (cm ³ /g STP)	Absolute Residual (cm ³ /g STP)	Relative Residual
0.881179392	0.1789	0.1777	0.0011	0.006305
0.886428118	0.1830	0.1843	-0.0013	-0.006871
0.891459525	0.1872	0.1860	0.0013	0.006833
0.896281302	0.1915	0.1927	-0.0012	-0.006266
0.900900900	0.1956	0.1944	0.0012	0.006233
0.905325770	0.1996	0.2006	-0.0010	-0.005006
0.909563184	0.2034	0.2024	0.0010	0.004995
0.913620114	0.2070	0.2070	-0.0001	-0.000382
0.917503417	0.2097	0.2089	0.0008	0.003588
0.921219707	0.2115	0.2109	0.0006	0.002678
0.924775481	0.2128	0.2129	0.0000	-0.000119
0.928177178	0.2143	0.2148	-0.0006	-0.002576
0.931430817	0.2161	0.2168	-0.0006	-0.002944
0.934542298	0.2187	0.2194	-0.0007	-0.003424
0.937517405	0.2220	0.2213	0.0008	0.003423
0.940361619	0.2264	0.2281	-0.0018	-0.007853
0.943080306	0.2317	0.2300	0.0018	0.007723
0.945678592	0.2382	0.2410	-0.0028	-0.011916
0.948161721	0.2457	0.2429	0.0029	0.011603
0.950534225	0.2543	0.2542	0.0000	0.000026
0.952800930	0.2638	0.2680	-0.0042	-0.016106
0.954966187	0.2743	0.2700	0.0043	0.015537
0.957034409	0.2856	0.2907	-0.0050	-0.017597
0.959009588	0.2978	0.2927	0.0050	0.016922
0.960896015	0.3102	0.3152	-0.0049	-0.015934
0.962697208	0.3222	0.3172	0.0050	0.015377
0.964416981	0.3336	0.3380	-0.0045	-0.013402
0.966058910	0.3445	0.3400	0.0045	0.013003
0.967626274	0.3548	0.3548	0.0000	0.000006
0.969122529	0.3648	0.3686	-0.0038	-0.010408
0.970550597	0.3742	0.3704	0.0038	0.010160
0.971913695	0.3833	0.3866	-0.0033	-0.008694
0.973214507	0.3919	0.3886	0.0033	0.008514
0.974455774	0.4001	0.4030	-0.0029	-0.007151
0.975640416	0.4080	0.4051	0.0029	0.007023
0.976770699	0.4155	0.4155	0.0000	0.000001
0.977849126	0.4226	0.4249	-0.0023	-0.005467

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DFT Plus(R) V3.00 (ASAP 2020 V1.05) Unit 1 Page 6

Sample: STONE5_2
 Operator:
 Submitter:
 Source File: D:\DATA\2020\EVA\STONE5_2.SMP

Started: 2010-08-19 9:30:17 Analysis Adsorptive: N2
 Completed: 2010-08-19 14:59:06 Analysis Bath: 77.434 K
 Report Time: 2010-12-22 11:55:55 Thermal Correction: No
 Sample Mass: 13.4041 g Equil. Interval: 10 s
 Warm Freespace: 22.5588 cm³ Cold Freespace: 65.2999 cm³

Porosity Distribution by Original Density Functional Theory
 Model: N2 @ 77K on Carbon, Slit Pores
 Method: Non-negative Regularization; No Smoothing

Standard Deviation of Fit: 0.00172, cm³/g

Isotherm Table

Relative Pressure	Experimental Quantity Adsorbed (cm ³ /g STP)	Fitted Quantity Adsorbed (cm ³ /g STP)	Absolute Residual (cm ³ /g STP)	Relative Residual
0.978878021	0.4294	0.4271	0.0023	0.005386
0.979859591	0.4360	0.4380	-0.0021	-0.004712
0.980795979	0.4422	0.4401	0.0021	0.004650
0.981689274	0.4481	0.4481	0.0000	0.000000
0.982541502	0.4537	0.4554	-0.0016	-0.003609
0.983354270	0.4591	0.4575	0.0016	0.003570
0.984129488	0.4643	0.4643	0.0000	0.000000

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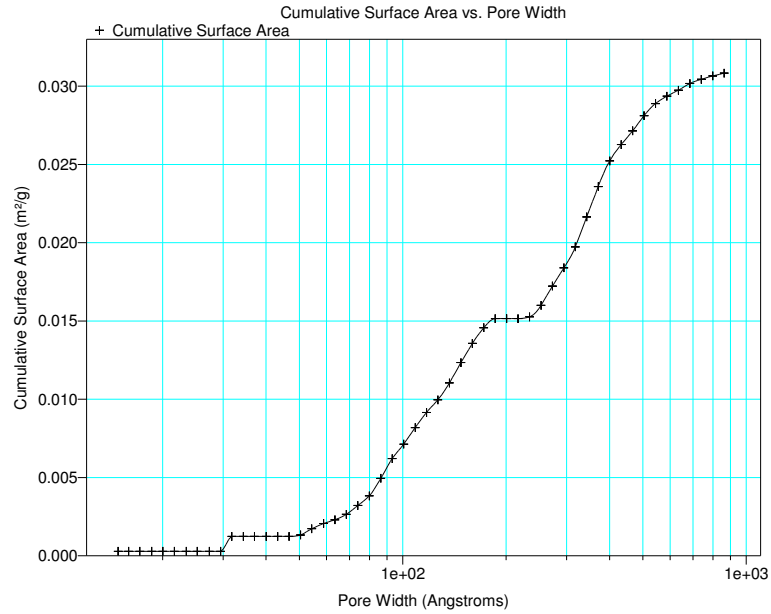
DFT Plus(R) V3.00 (ASAP 2020 V1.05) Unit 1 Page 7

Sample: STONE5_2
Operator:
Submitter:
Source File: D:\DATA\2020\EVA\STONE5_2.SMP

Started: 2010-08-19 9:30:17 Analysis Adsorptive: N2
Completed: 2010-08-19 14:59:06 Analysis Bath: 77.434 K
Report Time: 2010-12-22 11:55:55 Thermal Correction: No
Sample Mass: 13.4041 g Equil. Interval: 10 s
Warm Freespace: 22.5588 cm³ Cold Freespace: 65.2999 cm³

Porosity Distribution by Original Density Functional Theory
Model: N2 @ 77K on Carbon, Slit Pores
Method: Non-negative Regularization; No Smoothing

Volume in Pores < 14.83 Å : 0.00001 cm³/g
Total Volume in Pores <= 862.45 Å : 0.00042 cm³/g
Area in Pores > 862.45 Å : 0.104 m²/g
Total Area in Pores >= 14.83 Å : 0.135 m²/g



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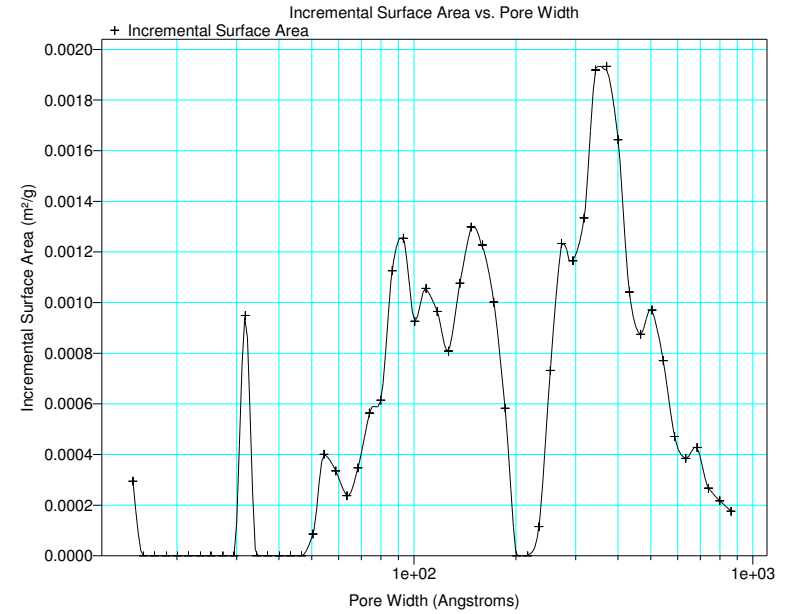
DFT Plus(R) V3.00 (ASAP 2020 V1.05) Unit 1 Page 8

Sample: STONE5_2
Operator:
Submitter:
Source File: D:\DATA\2020\EVA\STONE5_2.SMP

Started: 2010-08-19 9:30:17 Analysis Adsorptive: N2
Completed: 2010-08-19 14:59:06 Analysis Bath: 77.434 K
Report Time: 2010-12-22 11:55:55 Thermal Correction: No
Sample Mass: 13.4041 g Equil. Interval: 10 s
Warm Freespace: 22.5588 cm³ Cold Freespace: 65.2999 cm³

Porosity Distribution by Original Density Functional Theory
Model: N2 @ 77K on Carbon, Slit Pores
Method: Non-negative Regularization; No Smoothing

Volume in Pores < 14.83 Å : 0.00001 cm³/g
Total Volume in Pores <= 862.45 Å : 0.00042 cm³/g
Area in Pores > 862.45 Å : 0.104 m²/g
Total Area in Pores >= 14.83 Å : 0.135 m²/g



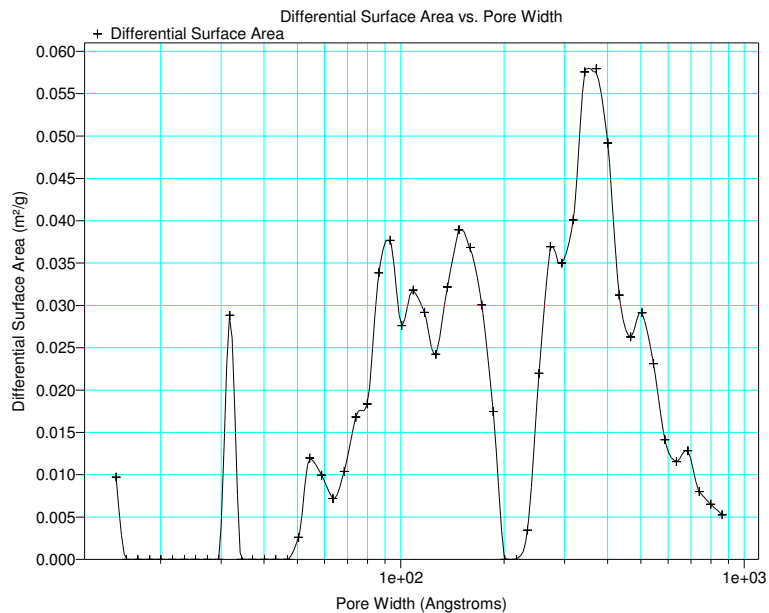
Micromeritics Instrument Corporation

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Sample: STONE5_2
 Operator:
 Submitter:
 Source File: D:\DATA\2020\EVA\STONE5_2.SMP
 Started: 2010-08-19 9:30:17 Analysis Adsorptive: N2
 Completed: 2010-08-19 14:59:06 Analysis Bath: 77.434 K
 Report Time: 2010-12-22 11:55:55 Thermal Correction: No
 Sample Mass: 13.4041 g Equil. Interval: 10 s
 Warm Freespace: 22.5588 cm³ Cold Freespace: 65.2999 cm³

Porosity Distribution by Original Density Functional Theory
 Model: N2 @ 77K on Carbon, Slit Pores
 Method: Non-negative Regularization; No Smoothing

Volume in Pores <	14.83 Å	:	0.00001 cm ³ /g
Total Volume in Pores <=	862.45 Å	:	0.00042 cm ³ /g
Area in Pores >	862.45 Å	:	0.104 m ² /g
Total Area in Pores >=	14.83 Å	:	0.135 m ² /g



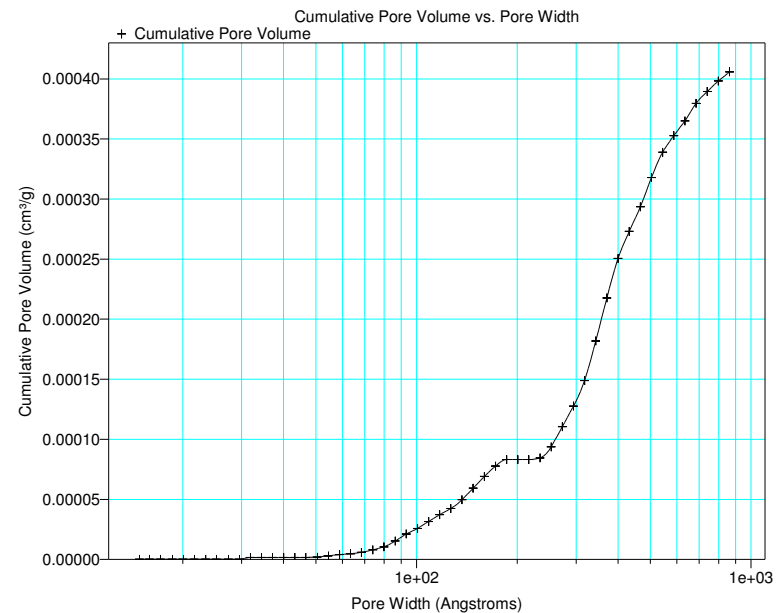
Micromeritics Instrument Corporation

DFT Plus(R) V3.00 (ASAP 2020 V1.05) Unit 1 Page 10

Sample: STONE5_2
 Operator:
 Submitter:
 Source File: D:\DATA\2020\EVA\STONE5_2.SMP
 Started: 2010-08-19 9:30:17 Analysis Adsorptive: N2
 Completed: 2010-08-19 14:59:06 Analysis Bath: 77.434 K
 Report Time: 2010-12-22 11:55:55 Thermal Correction: No
 Sample Mass: 13.4041 g Equil. Interval: 10 s
 Warm Freespace: 22.5588 cm³ Cold Freespace: 65.2999 cm³

Porosity Distribution by Original Density Functional Theory
 Model: N2 @ 77K on Carbon, Slit Pores
 Method: Non-negative Regularization; No Smoothing

Volume in Pores <	14.83 Å	:	0.00001 cm ³ /g
Total Volume in Pores <=	862.45 Å	:	0.00042 cm ³ /g
Area in Pores >	862.45 Å	:	0.104 m ² /g
Total Area in Pores >=	14.83 Å	:	0.135 m ² /g



Micromeritics Instrument Corporation

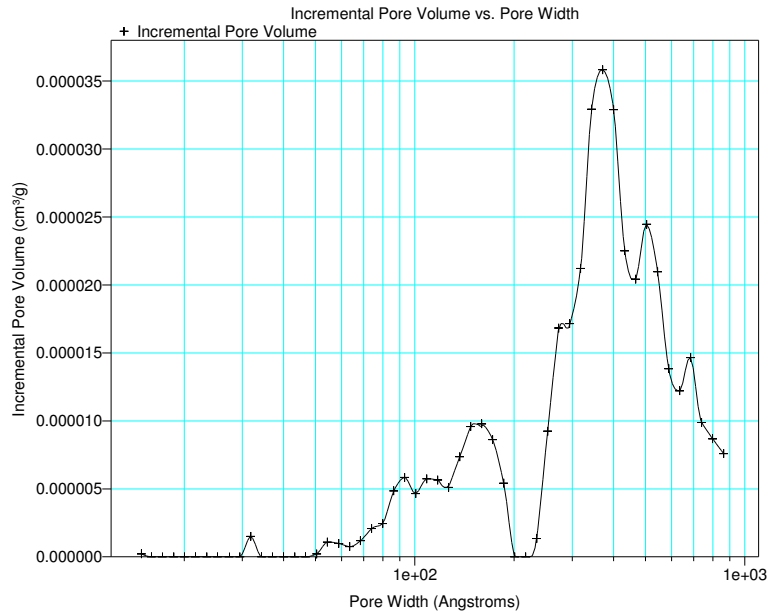
DFT Plus(R) V3.00 (ASAP 2020 V1.05) Unit 1 Page11

Sample: STONE5_2
 Operator:
 Submitter:
 Source File: D:\DATA\2020\EVA\STONE5_2.SMP

Started: 2010-08-19 9:30:17 Analysis Adsorptive: N2
 Completed: 2010-08-19 14:59:06 Analysis Bath: 77.434 K
 Report Time: 2010-12-22 11:55:55 Thermal Correction: No
 Sample Mass: 13.4041 g Equil. Interval: 10 s
 Warm Freespace: 22.5588 cm³ Cold Freespace: 65.2999 cm³

Porosity Distribution by Original Density Functional Theory
 Model: N2 @ 77K on Carbon, Slit Pores
 Method: Non-negative Regularization; No Smoothing

Volume in Pores <	14.83 Å	:	0.00001 cm ³ /g
Total Volume in Pores <=	862.45 Å	:	0.00042 cm ³ /g
Area in Pores >	862.45 Å	:	0.104 m ² /g
Total Area in Pores >=	14.83 Å	:	0.135 m ² /g



Micromeritics Instrument Corporation

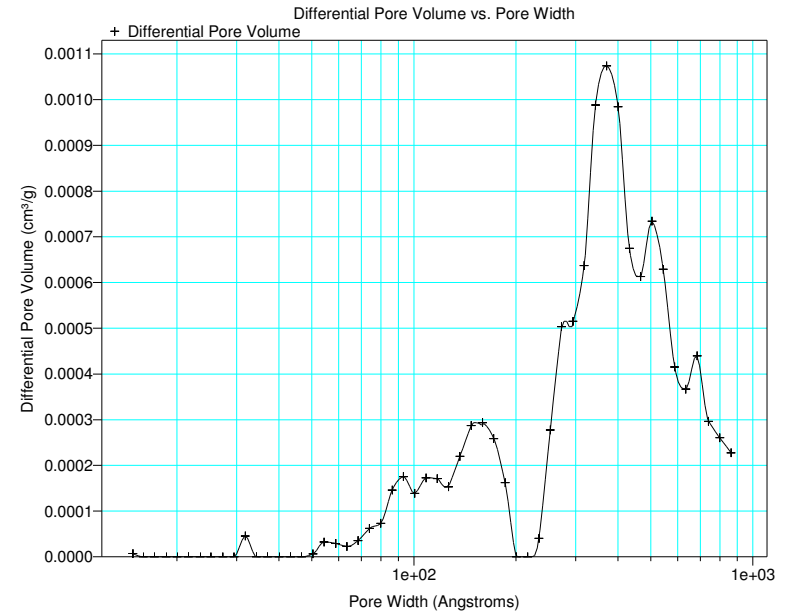
DFT Plus(R) V3.00 (ASAP 2020 V1.05) Unit 1 Page12

Sample: STONE5_2
 Operator:
 Submitter:
 Source File: D:\DATA\2020\EVA\STONE5_2.SMP

Started: 2010-08-19 9:30:17 Analysis Adsorptive: N2
 Completed: 2010-08-19 14:59:06 Analysis Bath: 77.434 K
 Report Time: 2010-12-22 11:55:55 Thermal Correction: No
 Sample Mass: 13.4041 g Equil. Interval: 10 s
 Warm Freespace: 22.5588 cm³ Cold Freespace: 65.2999 cm³

Porosity Distribution by Original Density Functional Theory
 Model: N2 @ 77K on Carbon, Slit Pores
 Method: Non-negative Regularization; No Smoothing

Volume in Pores <	14.83 Å	:	0.00001 cm ³ /g
Total Volume in Pores <=	862.45 Å	:	0.00042 cm ³ /g
Area in Pores >	862.45 Å	:	0.104 m ² /g
Total Area in Pores >=	14.83 Å	:	0.135 m ² /g

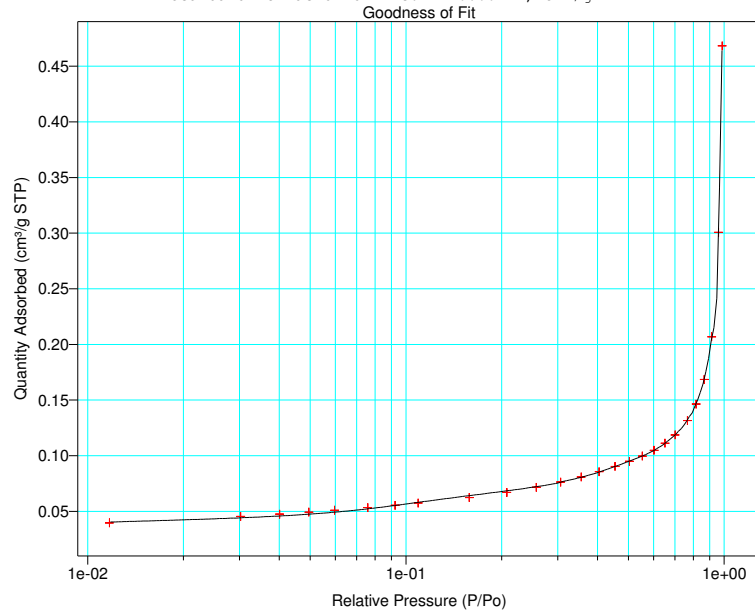


Micromeritics Instrument Corporation
 DFT Plus(R) V3.00 (ASAP 2020 V1.05) Unit 1 Page13

Sample: STONE5_2
 Operator:
 Submitter:
 Source File: D:\DATA\2020\EVA\STONE5_2.SMP
 Started: 2010-08-19 9:30:17 Analysis Adsorptive: N2
 Completed: 2010-08-19 14:59:06 Analysis Bath: 77.434 K
 Report Time: 2010-12-22 11:55:55 Thermal Correction: No
 Sample Mass: 13.4041 g Equil. Interval: 10 s
 Warm Freespace: 22.5588 cm³ Cold Freespace: 65.2999 cm³

Porosity Distribution by Original Density Functional Theory
 Model: N2 @ 77K on Carbon, Slit Pores
 Method: Non-negative Regularization; No Smoothing

Standard Deviation of Fit: 0.00172, cm³/g

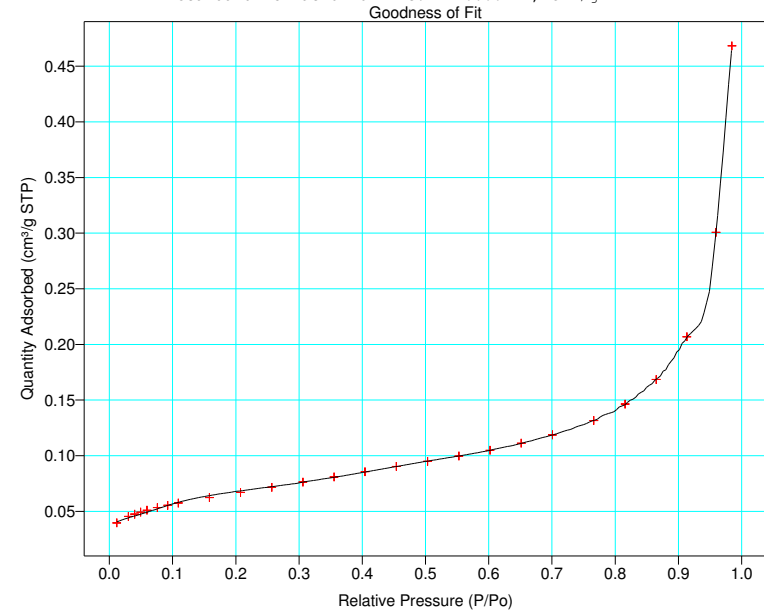


Micromeritics Instrument Corporation
 DFT Plus(R) V3.00 (ASAP 2020 V1.05) Unit 1 Page14

Sample: STONE5_2
 Operator:
 Submitter:
 Source File: D:\DATA\2020\EVA\STONE5_2.SMP
 Started: 2010-08-19 9:30:17 Analysis Adsorptive: N2
 Completed: 2010-08-19 14:59:06 Analysis Bath: 77.434 K
 Report Time: 2010-12-22 11:55:55 Thermal Correction: No
 Sample Mass: 13.4041 g Equil. Interval: 10 s
 Warm Freespace: 22.5588 cm³ Cold Freespace: 65.2999 cm³

Porosity Distribution by Original Density Functional Theory
 Model: N2 @ 77K on Carbon, Slit Pores
 Method: Non-negative Regularization; No Smoothing

Standard Deviation of Fit: 0.00172, cm³/g



A2.16 Pore size distributions (PSD) according to the density functional theory (DFT) (as referenced to in Section 3.2.2) for the M sample size fraction 0.25–0.5 mm

Micromeritics Instrument Corporation
DFT Plus(R) V3.00 (ASAP 2020 V1.05) Unit 1 Page 1

Sample: STONE7
Operator:
Submitter:
Source File: D:\DATA\2020\EVA\STONE7.SMP
Started: 2010-08-26 16:10:34 Analysis Adsorptive: N2
Completed: 2010-08-27 11:57:51 Analysis Bath: 77.458 K
Report Time: 2010-12-22 11:56:29 Thermal Correction: No
Sample Mass: 11.1358 g Equil. Interval: 10 s
Warm Freespace: 23.5373 cm³ Cold Freespace: 68.4897 cm³

Porosity Distribution by Original Density Functional Theory
Model: N2 @ 77K on Carbon, Slit Pores
Method: Non-negative Regularization; No Smoothing

Volume in Pores < 14.83 Å : 0.00001 cm³/g
Total Volume in Pores <= 798.65 Å : 0.00049 cm³/g
Area in Pores > 798.65 Å : 0.164 m²/g
Total Area in Pores >= 14.83 Å : 0.210 m²/g

Pore Size Table

Pore Width (Å)	Cumulative Volume (cm ³ /g)	Incremental Volume (cm ³ /g)	Cumulative Area (m ² /g)	Incremental Area (m ² /g)
14.83	0.00001	0.00001	0.007	0.007
15.91	0.00001	0.00000	0.008	0.001
17.16	0.00001	0.00000	0.008	0.000
18.59	0.00001	0.00000	0.008	0.000
20.02	0.00001	0.00000	0.008	0.000
21.62	0.00001	0.00000	0.008	0.000
23.41	0.00001	0.00000	0.008	0.000
25.20	0.00001	0.00000	0.008	0.000
27.34	0.00001	0.00000	0.009	0.001
29.49	0.00001	0.00000	0.012	0.003
31.81	0.00001	0.00000	0.013	0.001
34.31	0.00001	0.00000	0.013	0.000
36.99	0.00001	0.00000	0.013	0.000
40.03	0.00001	0.00000	0.013	0.000
43.25	0.00001	0.00000	0.013	0.000
46.64	0.00001	0.00000	0.013	0.000
50.40	0.00001	0.00000	0.013	0.000
54.33	0.00002	0.00000	0.014	0.000
58.80	0.00002	0.00000	0.014	0.000
63.44	0.00002	0.00000	0.014	0.000
68.45	0.00002	0.00000	0.014	0.000
73.99	0.00002	0.00000	0.015	0.001
79.88	0.00002	0.00000	0.015	0.001
86.32	0.00003	0.00001	0.017	0.001
93.11	0.00003	0.00001	0.018	0.001
100.61	0.00004	0.00000	0.019	0.001
108.66	0.00004	0.00001	0.020	0.001
117.23	0.00005	0.00001	0.021	0.001
126.53	0.00005	0.00001	0.022	0.001
136.71	0.00006	0.00001	0.023	0.001
147.61	0.00007	0.00001	0.025	0.002
159.41	0.00009	0.00001	0.026	0.001
172.10	0.00010	0.00001	0.027	0.001
185.86	0.00010	0.00000	0.028	0.000

Micromeritics Instrument Corporation
DFT Plus(R) V3.00 (ASAP 2020 V1.05) Unit 1 Page 2

Sample: STONE7
Operator:
Submitter:
Source File: D:\DATA\2020\EVA\STONE7.SMP
Started: 2010-08-26 16:10:34 Analysis Adsorptive: N2
Completed: 2010-08-27 11:57:51 Analysis Bath: 77.458 K
Report Time: 2010-12-22 11:56:29 Thermal Correction: No
Sample Mass: 11.1358 g Equil. Interval: 10 s
Warm Freespace: 23.5373 cm³ Cold Freespace: 68.4897 cm³

Porosity Distribution by Original Density Functional Theory
Model: N2 @ 77K on Carbon, Slit Pores
Method: Non-negative Regularization; No Smoothing

Volume in Pores < 14.83 Å : 0.00001 cm³/g
Total Volume in Pores <= 798.65 Å : 0.00049 cm³/g
Area in Pores > 798.65 Å : 0.164 m²/g
Total Area in Pores >= 14.83 Å : 0.210 m²/g

Pore Size Table

Pore Width (Å)	Cumulative Volume (cm ³ /g)	Incremental Volume (cm ³ /g)	Cumulative Area (m ² /g)	Incremental Area (m ² /g)
200.69	0.00010	0.00000	0.028	0.000
216.60	0.00010	0.00000	0.028	0.000
233.93	0.00010	0.00000	0.028	0.000
252.52	0.00011	0.00001	0.028	0.001
272.71	0.00013	0.00002	0.030	0.001
294.51	0.00015	0.00002	0.031	0.001
317.92	0.00018	0.00003	0.033	0.002
343.30	0.00022	0.00004	0.035	0.002
370.64	0.00026	0.00005	0.038	0.002
400.31	0.00030	0.00004	0.040	0.002
432.30	0.00033	0.00003	0.041	0.001
466.79	0.00036	0.00003	0.042	0.001
503.96	0.00039	0.00003	0.043	0.001
544.17	0.00041	0.00003	0.044	0.001
587.60	0.00043	0.00002	0.045	0.001
634.42	0.00045	0.00001	0.045	0.000
684.99	0.00046	0.00002	0.046	0.001
739.68	0.00047	0.00001	0.046	0.000
798.65	0.00048	0.00001	0.046	0.000

Micromeritics Instrument Corporation

DFT Plus(R) V3.00 (ASAP 2020 V1.05) Unit 1 Page 3

Sample: STONE7
 Operator:
 Submitter:
 Source File: D:\DATA\2020\EVA\STONE7.SMP

Started: 2010-08-26 16:10:34 Analysis Adsorptive: N2
 Completed: 2010-08-27 11:57:51 Analysis Bath: 77.458 K
 Report Time: 2010-12-22 11:56:29 Thermal Correction: No
 Sample Mass: 11.1358 g Equil. Interval: 10 s
 Warm Freespace: 23.5373 cm³ Cold Freespace: 68.4897 cm³

Porosity Distribution by Original Density Functional Theory
 Model: N2 @ 77K on Carbon, Slit Pores
 Method: Non-negative Regularization; No Smoothing

Standard Deviation of Fit: 0.00214, cm³/g

Isotherm Table

Relative Pressure	Experimental Quantity Adsorbed (cm ³ /g STP)	Fitted Quantity Adsorbed (cm ³ /g STP)	Absolute Residual (cm ³ /g STP)	Relative Residual
0.011783670	0.0509	0.0515	-0.0006	-0.012006
0.014515520	0.0524	0.0526	-0.0002	-0.003538
0.017706521	0.0541	0.0550	-0.0009	-0.016525
0.021398440	0.0559	0.0561	-0.0002	-0.003549
0.025631230	0.0579	0.0574	0.0005	0.009477
0.030442240	0.0599	0.0590	0.0009	0.015255
0.035865448	0.0618	0.0604	0.0014	0.023207
0.041930798	0.0637	0.0619	0.0018	0.027647
0.048663601	0.0656	0.0637	0.0020	0.029998
0.056084011	0.0677	0.0657	0.0021	0.030345
0.064206667	0.0698	0.0679	0.0019	0.026796
0.073040441	0.0718	0.0704	0.0014	0.018977
0.082588248	0.0738	0.0731	0.0006	0.008704
0.092847057	0.0758	0.0759	-0.0001	-0.001305
0.103808001	0.0780	0.0788	-0.0007	-0.009444
0.115456402	0.0802	0.0814	-0.0013	-0.015939
0.127772301	0.0823	0.0840	-0.0017	-0.020109
0.140730694	0.0845	0.0863	-0.0019	-0.021987
0.154301897	0.0866	0.0885	-0.0019	-0.021966
0.168452203	0.0888	0.0906	-0.0018	-0.020241
0.183144197	0.0911	0.0926	-0.0015	-0.016806
0.198337302	0.0934	0.0945	-0.0011	-0.012246
0.213988706	0.0957	0.0964	-0.0007	-0.007078
0.230053306	0.0981	0.0986	-0.0005	-0.004802
0.246484801	0.1006	0.1005	0.0001	0.001015
0.263235897	0.1030	0.1024	0.0007	0.006385
0.280259013	0.1055	0.1056	-0.0001	-0.001129
0.297506303	0.1079	0.1076	0.0004	0.003329
0.314930797	0.1104	0.1104	0.0000	-0.000064
0.332486212	0.1128	0.1125	0.0003	0.002670
0.350127310	0.1153	0.1148	0.0005	0.004298
0.367810607	0.1178	0.1172	0.0006	0.004768
0.385494202	0.1202	0.1197	0.0005	0.004243
0.403138310	0.1227	0.1223	0.0004	0.003034
0.420704991	0.1252	0.1250	0.0002	0.001536
0.438158900	0.1276	0.1276	0.0000	0.000067
0.455466807	0.1300	0.1302	-0.0002	-0.001163

Micromeritics Instrument Corporation

DFT Plus(R) V3.00 (ASAP 2020 V1.05) Unit 1 Page 4

Sample: STONE7
 Operator:
 Submitter:
 Source File: D:\DATA\2020\EVA\STONE7.SMP

Started: 2010-08-26 16:10:34 Analysis Adsorptive: N2
 Completed: 2010-08-27 11:57:51 Analysis Bath: 77.458 K
 Report Time: 2010-12-22 11:56:29 Thermal Correction: No
 Sample Mass: 11.1358 g Equil. Interval: 10 s
 Warm Freespace: 23.5373 cm³ Cold Freespace: 68.4897 cm³

Porosity Distribution by Original Density Functional Theory
 Model: N2 @ 77K on Carbon, Slit Pores
 Method: Non-negative Regularization; No Smoothing

Standard Deviation of Fit: 0.00214, cm³/g

Isotherm Table

Relative Pressure	Experimental Quantity Adsorbed (cm ³ /g STP)	Fitted Quantity Adsorbed (cm ³ /g STP)	Absolute Residual (cm ³ /g STP)	Relative Residual
0.472598106	0.1324	0.1327	-0.0003	-0.002157
0.489524394	0.1348	0.1351	-0.0004	-0.002836
0.506219923	0.1371	0.1375	-0.0004	-0.003086
0.522661209	0.1395	0.1398	-0.0004	-0.002564
0.5388827300	0.1419	0.1421	-0.0002	-0.001479
0.554699600	0.1443	0.1443	0.0000	-0.000295
0.570261598	0.1467	0.1465	0.0002	0.001067
0.585499227	0.1491	0.1492	0.0000	-0.000294
0.600400090	0.1516	0.1514	0.0001	0.000920
0.614954293	0.1540	0.1541	-0.0001	-0.000636
0.629153311	0.1566	0.1565	0.0001	0.000334
0.642990828	0.1591	0.1590	0.0001	0.000840
0.656461716	0.1616	0.1616	0.0000	0.000179
0.669562697	0.1643	0.1642	0.0000	0.000263
0.682291925	0.1670	0.1670	0.0000	0.000050
0.694648683	0.1698	0.1697	0.0000	0.000144
0.706633508	0.1725	0.1725	0.0000	0.000176
0.718248010	0.1754	0.1756	-0.0002	-0.000871
0.729494929	0.1784	0.1782	0.0002	0.001180
0.740377605	0.1815	0.1818	-0.0003	-0.001421
0.750900388	0.1847	0.1843	0.0003	0.001669
0.761068285	0.1877	0.1880	-0.0003	-0.001538
0.770887707	0.1908	0.1905	0.0003	0.001746
0.780362606	0.1942	0.1953	-0.0011	-0.005895
0.789501607	0.1978	0.1978	0.0000	-0.000028
0.798311174	0.2014	0.2002	0.0012	0.005947
0.806798697	0.2051	0.2056	-0.0005	-0.002372
0.814971626	0.2087	0.2081	0.0005	0.002496
0.822837889	0.2124	0.2130	-0.0006	-0.003044
0.830405474	0.2164	0.2157	0.0007	0.003129
0.837682605	0.2206	0.2214	-0.0007	-0.003282
0.844677329	0.2249	0.2242	0.0008	0.003340
0.851397991	0.2292	0.2299	-0.0007	-0.002839
0.857852995	0.2334	0.2327	0.0007	0.002890
0.864050388	0.2374	0.2381	-0.0007	-0.002988
0.869998574	0.2416	0.2408	0.0007	0.003025
0.875705481	0.2464	0.2477	-0.0013	-0.005375

Micromeritics Instrument Corporation

DFT Plus(R) V3.00 (ASAP 2020 V1.05) Unit 1 Page 5

Sample: STONE7
 Operator:
 Submitter:
 Source File: D:\DATA\2020\EVA\STONE7.SMP
 Started: 2010-08-26 16:10:34 Analysis Adsorptive: N2
 Completed: 2010-08-27 11:57:51 Analysis Bath: 77.458 K
 Report Time: 2010-12-22 11:56:29 Thermal Correction: No
 Sample Mass: 11.1358 g Equil. Interval: 10 s
 Warm Freespace: 23.5373 cm³ Cold Freespace: 68.4897 cm³

Porosity Distribution by Original Density Functional Theory
 Model: N2 @ 77K on Carbon, Slit Pores
 Method: Non-negative Regularization; No Smoothing

Standard Deviation of Fit: 0.00214, cm³/g

Isotherm Table

Relative Pressure	Experimental Quantity Adsorbed (cm ³ /g STP)	Fitted Quantity Adsorbed (cm ³ /g STP)	Absolute Residual (cm ³ /g STP)	Relative Residual
0.881179392	0.2517	0.2504	0.0013	0.005344
0.886428118	0.2573	0.2588	-0.0015	-0.005959
0.891459525	0.2629	0.2614	0.0016	0.005901
0.896281302	0.2685	0.2700	-0.0014	-0.005379
0.900900900	0.2740	0.2726	0.0015	0.005330
0.905325770	0.2793	0.2805	-0.0012	-0.004135
0.909563184	0.2844	0.2832	0.0012	0.004109
0.913620114	0.2891	0.2873	0.0018	0.006395
0.917503417	0.2925	0.2902	0.0023	0.008001
0.921219707	0.2946	0.2931	0.0015	0.004951
0.924775481	0.2962	0.2961	0.0000	0.000098
0.928177178	0.2978	0.2992	-0.0013	-0.004413
0.931430817	0.3001	0.3021	-0.0021	-0.006864
0.934542298	0.3032	0.3050	-0.0019	-0.006135
0.937517405	0.3074	0.3079	-0.0005	-0.001494
0.940361619	0.3130	0.3150	-0.0021	-0.006629
0.943080306	0.3199	0.3178	0.0021	0.006531
0.945678592	0.3283	0.3318	-0.0035	-0.010640
0.948161721	0.3381	0.3346	0.0035	0.010377
0.950534225	0.3493	0.3493	0.0000	0.000023
0.952800930	0.3618	0.3672	-0.0054	-0.014830
0.954966187	0.3756	0.3702	0.0054	0.014328
0.957034409	0.3905	0.3969	-0.0064	-0.016377
0.959009588	0.4066	0.4001	0.0064	0.015771
0.960896015	0.4229	0.4292	-0.0062	-0.014746
0.962697208	0.4386	0.4323	0.0063	0.014251
0.964416981	0.4535	0.4592	-0.0056	-0.012405
0.966058910	0.4678	0.4622	0.0056	0.012048
0.967626274	0.4814	0.4814	0.0000	0.000005
0.969122529	0.4944	0.4992	-0.0047	-0.009597
0.970550597	0.5069	0.5021	0.0048	0.009376
0.971913695	0.5187	0.5228	-0.0041	-0.007947
0.973214507	0.5300	0.5259	0.0041	0.007788
0.974455774	0.5408	0.5443	-0.0035	-0.006435
0.975640416	0.5511	0.5476	0.0035	0.006323
0.976770699	0.5609	0.5609	0.0000	0.000001
0.977849126	0.5703	0.5730	-0.0027	-0.004813

Micromeritics Instrument Corporation

DFT Plus(R) V3.00 (ASAP 2020 V1.05) Unit 1 Page 6

Sample: STONE7
 Operator:
 Submitter:
 Source File: D:\DATA\2020\EVA\STONE7.SMP
 Started: 2010-08-26 16:10:34 Analysis Adsorptive: N2
 Completed: 2010-08-27 11:57:51 Analysis Bath: 77.458 K
 Report Time: 2010-12-22 11:56:29 Thermal Correction: No
 Sample Mass: 11.1358 g Equil. Interval: 10 s
 Warm Freespace: 23.5373 cm³ Cold Freespace: 68.4897 cm³

Porosity Distribution by Original Density Functional Theory
 Model: N2 @ 77K on Carbon, Slit Pores
 Method: Non-negative Regularization; No Smoothing

Standard Deviation of Fit: 0.00214, cm³/g

Isotherm Table

Relative Pressure	Experimental Quantity Adsorbed (cm ³ /g STP)	Fitted Quantity Adsorbed (cm ³ /g STP)	Absolute Residual (cm ³ /g STP)	Relative Residual
0.978878021	0.5792	0.5765	0.0027	0.004744
0.979859591	0.5878	0.5902	-0.0024	-0.004117
0.980795979	0.5959	0.5935	0.0024	0.004065
0.981689274	0.6037	0.6037	0.0000	0.000000
0.982541502	0.6111	0.6130	-0.0019	-0.003059
0.983354270	0.6182	0.6163	0.0019	0.003027

Micromeritics Instrument Corporation

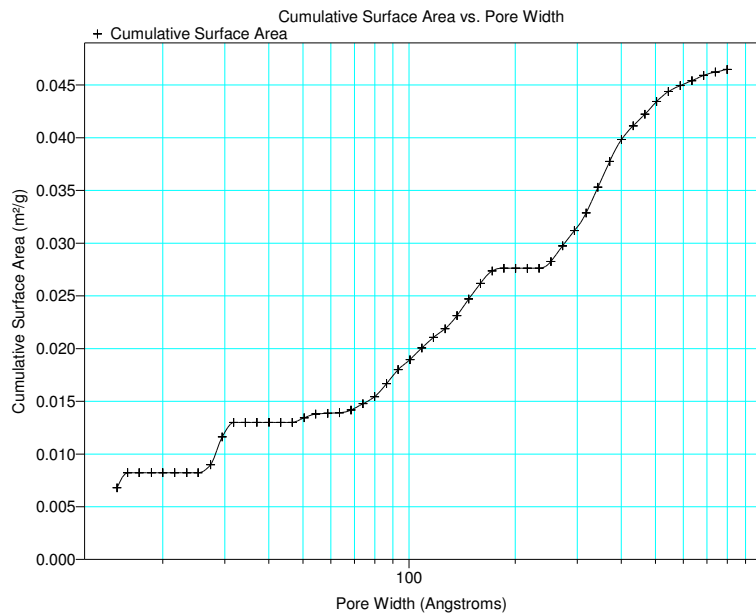
DFT Plus(R) V3.00 (ASAP 2020 V1.05) Unit 1 Page 7

Sample: STONE7
 Operator:
 Submitter:
 Source File: D:\DATA\2020\EVA\STONE7.SMP

Started: 2010-08-26 16:10:34 Analysis Adsorptive: N2
 Completed: 2010-08-27 11:57:51 Analysis Bath: 77.458 K
 Report Time: 2010-12-22 11:56:30 Thermal Correction: No
 Sample Mass: 11.1358 g Equil. Interval: 10 s
 Warm Freespace: 23.5373 cm³ Cold Freespace: 68.4897 cm³

Porosity Distribution by Original Density Functional Theory
 Model: N2 @ 77K on Carbon, Slit Pores
 Method: Non-negative Regularization; No Smoothing

Volume in Pores <	14.83 Å	:	0.00001 cm ³ /g
Total Volume in Pores <=	798.65 Å	:	0.00049 cm ³ /g
Area in Pores >	798.65 Å	:	0.164 m ² /g
Total Area in Pores >=	14.83 Å	:	0.210 m ² /g



Micromeritics Instrument Corporation

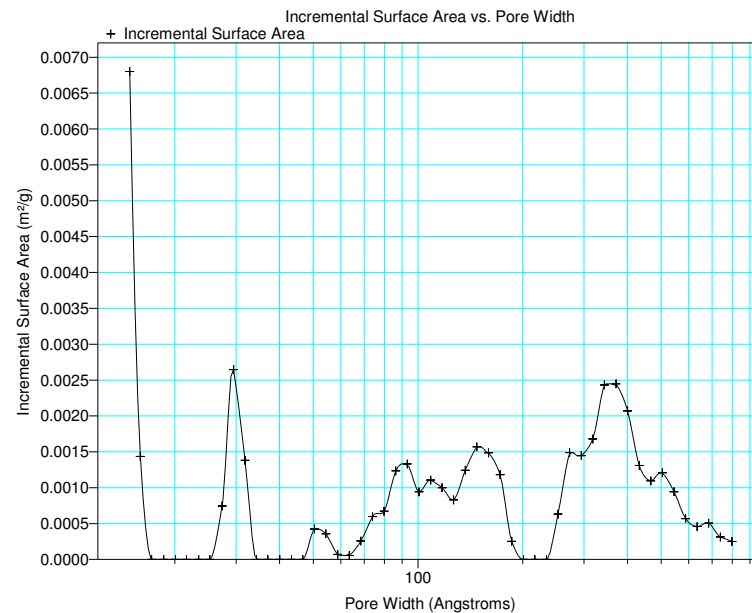
DFT Plus(R) V3.00 (ASAP 2020 V1.05) Unit 1 Page 8

Sample: STONE7
 Operator:
 Submitter:
 Source File: D:\DATA\2020\EVA\STONE7.SMP

Started: 2010-08-26 16:10:34 Analysis Adsorptive: N2
 Completed: 2010-08-27 11:57:51 Analysis Bath: 77.458 K
 Report Time: 2010-12-22 11:56:30 Thermal Correction: No
 Sample Mass: 11.1358 g Equil. Interval: 10 s
 Warm Freespace: 23.5373 cm³ Cold Freespace: 68.4897 cm³

Porosity Distribution by Original Density Functional Theory
 Model: N2 @ 77K on Carbon, Slit Pores
 Method: Non-negative Regularization; No Smoothing

Volume in Pores <	14.83 Å	:	0.00001 cm ³ /g
Total Volume in Pores <=	798.65 Å	:	0.00049 cm ³ /g
Area in Pores >	798.65 Å	:	0.164 m ² /g
Total Area in Pores >=	14.83 Å	:	0.210 m ² /g



Micromeritics Instrument Corporation

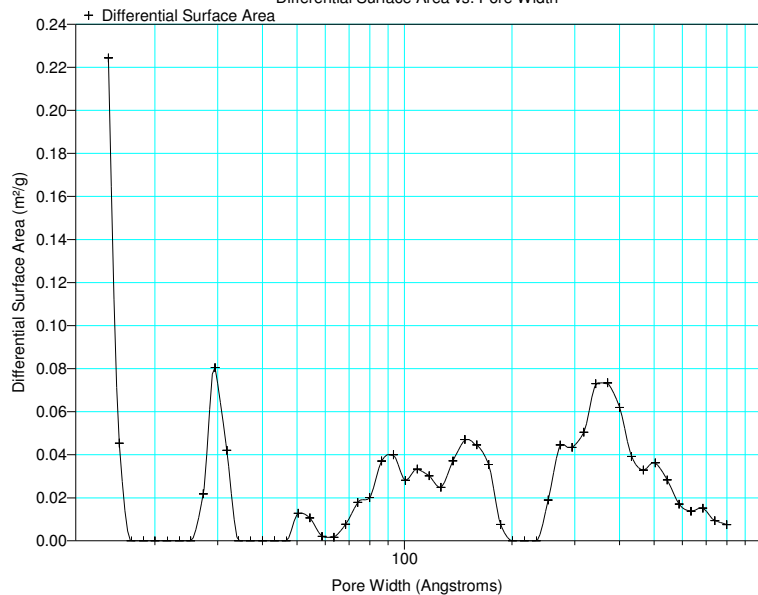
DFT Plus(R) V3.00 (ASAP 2020 V1.05) Unit 1 Page 9

Sample: STONE7
 Operator:
 Submitter:
 Source File: D:\DATA\2020\EVA\STONE7.SMP
 Started: 2010-08-26 16:10:34 Analysis Adsorptive: N2
 Completed: 2010-08-27 11:57:51 Analysis Bath: 77.458 K
 Report Time: 2010-12-22 11:56:30 Thermal Correction: No
 Sample Mass: 11.1358 g Equil. Interval: 10 s
 Warm Freespace: 23.5373 cm³ Cold Freespace: 68.4897 cm³

Porosity Distribution by Original Density Functional Theory
 Model: N2 @ 77K on Carbon, Slit Pores
 Method: Non-negative Regularization; No Smoothing

Volume in Pores <	14.83 Å	:	0.00001 cm ³ /g
Total Volume in Pores <=	798.65 Å	:	0.00049 cm ³ /g
Area in Pores >	798.65 Å	:	0.164 m ² /g
Total Area in Pores >=	14.83 Å	:	0.210 m ² /g

Differential Surface Area vs. Pore Width



Micromeritics Instrument Corporation

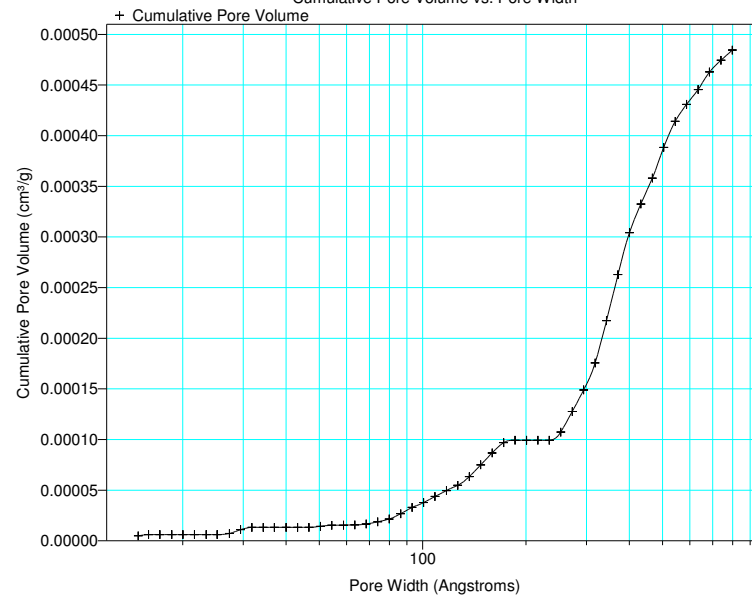
DFT Plus(R) V3.00 (ASAP 2020 V1.05) Unit 1 Page10

Sample: STONE7
 Operator:
 Submitter:
 Source File: D:\DATA\2020\EVA\STONE7.SMP
 Started: 2010-08-26 16:10:34 Analysis Adsorptive: N2
 Completed: 2010-08-27 11:57:51 Analysis Bath: 77.458 K
 Report Time: 2010-12-22 11:56:30 Thermal Correction: No
 Sample Mass: 11.1358 g Equil. Interval: 10 s
 Warm Freespace: 23.5373 cm³ Cold Freespace: 68.4897 cm³

Porosity Distribution by Original Density Functional Theory
 Model: N2 @ 77K on Carbon, Slit Pores
 Method: Non-negative Regularization; No Smoothing

Volume in Pores <	14.83 Å	:	0.00001 cm ³ /g
Total Volume in Pores <=	798.65 Å	:	0.00049 cm ³ /g
Area in Pores >	798.65 Å	:	0.164 m ² /g
Total Area in Pores >=	14.83 Å	:	0.210 m ² /g

Cumulative Pore Volume vs. Pore Width



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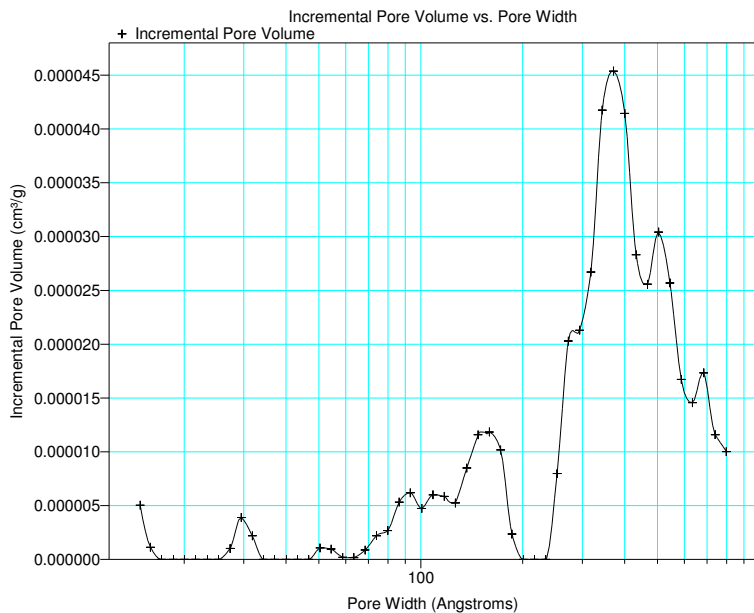
DFT Plus(R) V3.00 (ASAP 2020 V1.05) Unit 1 Page11

Sample: STONE7
 Operator:
 Submitter:
 Source File: D:\DATA\2020\EVA\STONE7.SMP

Started: 2010-08-26 16:10:34 Analysis Adsorptive: N2
 Completed: 2010-08-27 11:57:51 Analysis Bath: 77.458 K
 Report Time: 2010-12-22 11:56:30 Thermal Correction: No
 Sample Mass: 11.1358 g Equil. Interval: 10 s
 Warm Freespace: 23.5373 cm³ Cold Freespace: 68.4897 cm³

Porosity Distribution by Original Density Functional Theory
 Model: N2 @ 77K on Carbon, Slit Pores
 Method: Non-negative Regularization; No Smoothing

Volume in Pores <	14.83 Å	:	0.00001 cm ³ /g
Total Volume in Pores <=	798.65 Å	:	0.00049 cm ³ /g
Area in Pores >	798.65 Å	:	0.164 m ² /g
Total Area in Pores >=	14.83 Å	:	0.210 m ² /g



Micromeritics Instrument Corporation

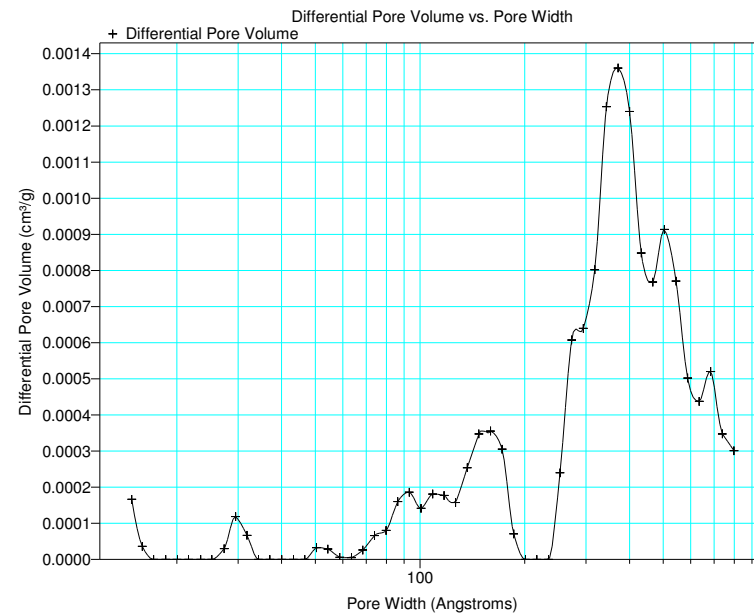
DFT Plus(R) V3.00 (ASAP 2020 V1.05) Unit 1 Page12

Sample: STONE7
 Operator:
 Submitter:
 Source File: D:\DATA\2020\EVA\STONE7.SMP

Started: 2010-08-26 16:10:34 Analysis Adsorptive: N2
 Completed: 2010-08-27 11:57:51 Analysis Bath: 77.458 K
 Report Time: 2010-12-22 11:56:30 Thermal Correction: No
 Sample Mass: 11.1358 g Equil. Interval: 10 s
 Warm Freespace: 23.5373 cm³ Cold Freespace: 68.4897 cm³

Porosity Distribution by Original Density Functional Theory
 Model: N2 @ 77K on Carbon, Slit Pores
 Method: Non-negative Regularization; No Smoothing

Volume in Pores <	14.83 Å	:	0.00001 cm ³ /g
Total Volume in Pores <=	798.65 Å	:	0.00049 cm ³ /g
Area in Pores >	798.65 Å	:	0.164 m ² /g
Total Area in Pores >=	14.83 Å	:	0.210 m ² /g



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DFT Plus(R) V3.00 (ASAP 2020 V1.05)

Unit 1

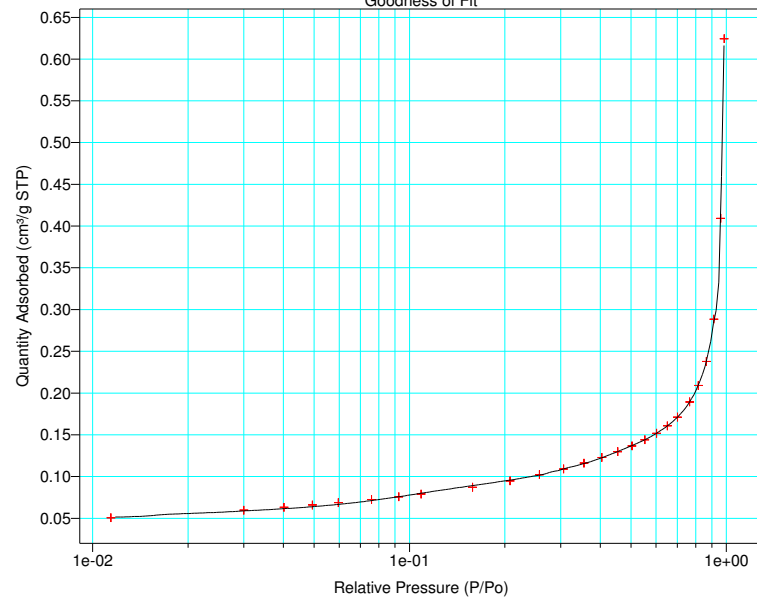
Page13

Sample: STONE7
 Operator:
 Submitter:
 Source File: D:\DATA\2020\EVA\STONE7.SMP

Started: 2010-08-26 16:10:34 Analysis Adsorptive: N2
 Completed: 2010-08-27 11:57:51 Analysis Bath: 77.458 K
 Report Time: 2010-12-22 11:56:30 Thermal Correction: No
 Sample Mass: 11.1358 g Equil. Interval: 10 s
 Warm Freespace: 23.5373 cm³ Cold Freespace: 68.4897 cm³

Porosity Distribution by Original Density Functional Theory
 Model: N2 @ 77K on Carbon, Slit Pores
 Method: Non-negative Regularization; No Smoothing

Standard Deviation of Fit: 0.00214, cm³/g
 Goodness of Fit



Micromeritics Instrument Corporation

DFT Plus(R) V3.00 (ASAP 2020 V1.05)

Unit 1

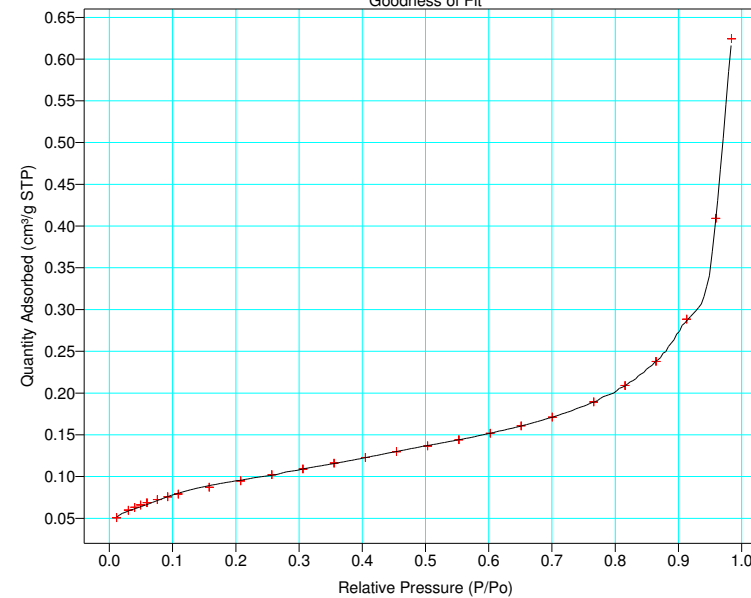
Page14

Sample: STONE7
 Operator:
 Submitter:
 Source File: D:\DATA\2020\EVA\STONE7.SMP

Started: 2010-08-26 16:10:34 Analysis Adsorptive: N2
 Completed: 2010-08-27 11:57:51 Analysis Bath: 77.458 K
 Report Time: 2010-12-22 11:56:30 Thermal Correction: No
 Sample Mass: 11.1358 g Equil. Interval: 10 s
 Warm Freespace: 23.5373 cm³ Cold Freespace: 68.4897 cm³

Porosity Distribution by Original Density Functional Theory
 Model: N2 @ 77K on Carbon, Slit Pores
 Method: Non-negative Regularization; No Smoothing

Standard Deviation of Fit: 0.00214, cm³/g
 Goodness of Fit



A2.17 Pore size distributions (PSD) according to the density functional theory (DFT) (as referenced to in Section 3.2.2) for the M sample size fraction 0.5–1 mm

Micromeritics Instrument Corporation

DFT Plus(R) V3.00 (ASAP 2020 V1.05) Unit 1 Page 1

Sample: STONE4
 Operator:
 Submitter:
 Source File: D:\DATA\2020\EVA\STONE4.SMP

Started: 2010-08-18 15:10:05 Analysis Adsorptive: N2
 Completed: 2010-08-18 20:57:59 Analysis Bath: 77.395 K
 Report Time: 2010-12-22 11:55:40 Thermal Correction: No
 Sample Mass: 11.8628 g Equil. Interval: 10 s
 Warm Freespace: 23.4907 cm³ Cold Freespace: 68.4359 cm³

Porosity Distribution by Original Density Functional Theory
 Model: N2 @ 77K on Carbon, Slit Pores
 Method: Non-negative Regularization; No Smoothing

Volume in Pores < 14.83 Å : 0.00000 cm³/g
 Total Volume in Pores <= 862.45 Å : 0.00037 cm³/g
 Area in Pores > 862.45 Å : 0.099 m²/g
 Total Area in Pores >= 14.83 Å : 0.129 m²/g

Pore Size Table

Pore Width (Å)	Cumulative Volume (cm ³ /g)	Incremental Volume (cm ³ /g)	Cumulative Area (m ² /g)	Incremental Area (m ² /g)
14.83	0.00000	0.00000	0.000	0.000
15.91	0.00000	0.00000	0.000	0.000
17.16	0.00000	0.00000	0.000	0.000
18.59	0.00000	0.00000	0.000	0.000
20.02	0.00000	0.00000	0.000	0.000
21.62	0.00000	0.00000	0.000	0.000
23.41	0.00000	0.00000	0.000	0.000
25.20	0.00000	0.00000	0.000	0.000
27.34	0.00000	0.00000	0.000	0.000
29.49	0.00000	0.00000	0.001	0.001
31.81	0.00000	0.00000	0.003	0.001
34.31	0.00001	0.00000	0.003	0.001
36.99	0.00001	0.00000	0.003	0.000
40.03	0.00001	0.00000	0.003	0.000
43.25	0.00001	0.00000	0.003	0.000
46.64	0.00001	0.00000	0.004	0.000
50.40	0.00001	0.00000	0.004	0.000
54.33	0.00001	0.00000	0.005	0.000
58.80	0.00001	0.00000	0.005	0.000
63.44	0.00001	0.00000	0.005	0.000
68.45	0.00001	0.00000	0.006	0.000
73.99	0.00001	0.00000	0.006	0.001
79.88	0.00002	0.00000	0.007	0.001
86.32	0.00002	0.00000	0.008	0.001
93.11	0.00003	0.00001	0.009	0.001
100.61	0.00003	0.00000	0.010	0.001
108.66	0.00003	0.00000	0.011	0.001
117.23	0.00004	0.00000	0.011	0.001
126.53	0.00004	0.00000	0.012	0.001
136.71	0.00005	0.00001	0.013	0.001
147.61	0.00006	0.00001	0.014	0.001
159.41	0.00007	0.00001	0.015	0.001
172.10	0.00008	0.00001	0.016	0.001
185.86	0.00008	0.00000	0.017	0.000

Micromeritics Instrument Corporation

DFT Plus(R) V3.00 (ASAP 2020 V1.05) Unit 1 Page 2

Sample: STONE4
 Operator:
 Submitter:
 Source File: D:\DATA\2020\EVA\STONE4.SMP

Started: 2010-08-18 15:10:05 Analysis Adsorptive: N2
 Completed: 2010-08-18 20:57:59 Analysis Bath: 77.395 K
 Report Time: 2010-12-22 11:55:40 Thermal Correction: No
 Sample Mass: 11.8628 g Equil. Interval: 10 s
 Warm Freespace: 23.4907 cm³ Cold Freespace: 68.4359 cm³

Porosity Distribution by Original Density Functional Theory
 Model: N2 @ 77K on Carbon, Slit Pores
 Method: Non-negative Regularization; No Smoothing

Volume in Pores < 14.83 Å : 0.00000 cm³/g
 Total Volume in Pores <= 862.45 Å : 0.00037 cm³/g
 Area in Pores > 862.45 Å : 0.099 m²/g
 Total Area in Pores >= 14.83 Å : 0.129 m²/g

Pore Size Table

Pore Width (Å)	Cumulative Volume (cm ³ /g)	Incremental Volume (cm ³ /g)	Cumulative Area (m ² /g)	Incremental Area (m ² /g)
200.69	0.00008	0.00000	0.017	0.000
216.60	0.00008	0.00000	0.017	0.000
233.93	0.00008	0.00000	0.017	0.000
252.52	0.00009	0.00001	0.017	0.000
272.71	0.00010	0.00001	0.018	0.001
294.51	0.00011	0.00001	0.019	0.001
317.92	0.00013	0.00002	0.020	0.001
343.30	0.00016	0.00003	0.022	0.002
370.64	0.00019	0.00003	0.024	0.002
400.31	0.00023	0.00003	0.025	0.002
432.30	0.00025	0.00002	0.026	0.001
466.79	0.00027	0.00002	0.027	0.001
503.96	0.00029	0.00002	0.028	0.001
544.17	0.00031	0.00002	0.029	0.001
587.60	0.00032	0.00001	0.029	0.000
634.42	0.00033	0.00001	0.030	0.000
684.99	0.00035	0.00001	0.030	0.000
739.68	0.00036	0.00001	0.030	0.000
798.65	0.00036	0.00001	0.030	0.000
862.45	0.00037	0.00001	0.031	0.000

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DFT Plus(R) V3.00 (ASAP 2020 V1.05)

Unit 1

Page 3

Sample: STONE4
 Operator:
 Submitter:
 Source File: D:\DATA\2020\EVA\STONE4.SMP

Started: 2010-08-18 15:10:05 Analysis Adsorptive: N2
 Completed: 2010-08-18 20:57:59 Analysis Bath: 77.395 K
 Report Time: 2010-12-22 11:55:40 Thermal Correction: No
 Sample Mass: 11.8628 g Equil. Interval: 10 s
 Warm Freespace: 23.4907 cm³ Cold Freespace: 68.4359 cm³

Porosity Distribution by Original Density Functional Theory
 Model: N2 @ 77K on Carbon, Slit Pores
 Method: Non-negative Regularization; No Smoothing

Standard Deviation of Fit: 0.00159, cm³/g

Isotherm Table

Relative Pressure	Experimental Quantity Adsorbed (cm ³ /g STP)	Fitted Quantity Adsorbed (cm ³ /g STP)	Absolute Residual (cm ³ /g STP)	Relative Residual
0.014515520	0.0285	0.0288	-0.0003	-0.010066
0.017706521	0.0295	0.0294	0.0001	0.002199
0.021398440	0.0306	0.0301	0.0005	0.015945
0.025631230	0.0317	0.0308	0.0009	0.029342
0.030442240	0.0329	0.0316	0.0013	0.040032
0.035865448	0.0340	0.0324	0.0016	0.046987
0.041930798	0.0351	0.0334	0.0017	0.049115
0.048663601	0.0362	0.0345	0.0017	0.048154
0.056084011	0.0374	0.0357	0.0017	0.044889
0.064206667	0.0384	0.0371	0.0013	0.034283
0.073040441	0.0393	0.0387	0.0006	0.015728
0.082588248	0.0404	0.0404	0.0000	0.000734
0.092847057	0.0417	0.0422	-0.0005	-0.012396
0.103808001	0.0430	0.0440	-0.0010	-0.023022
0.115456402	0.0443	0.0457	-0.0013	-0.030405
0.127772301	0.0457	0.0473	-0.0016	-0.034606
0.140730694	0.0471	0.0488	-0.0017	-0.035959
0.154301897	0.0485	0.0502	-0.0017	-0.035038
0.168452203	0.0499	0.0515	-0.0016	-0.032230
0.183144197	0.0513	0.0527	-0.0014	-0.027640
0.198337302	0.0528	0.0540	-0.0012	-0.021951
0.213988706	0.0543	0.0552	-0.0009	-0.015764
0.230053306	0.0558	0.0563	-0.0005	-0.009159
0.246484801	0.0574	0.0575	-0.0001	-0.002332
0.263235897	0.0590	0.0587	0.0003	0.004488
0.280259013	0.0606	0.0607	0.0000	-0.000737
0.297506303	0.0623	0.0619	0.0003	0.005493
0.314930797	0.0639	0.0641	-0.0001	-0.002344
0.332486212	0.0655	0.0654	0.0001	0.001621
0.350127310	0.0672	0.0669	0.0003	0.004337
0.367810607	0.0688	0.0687	0.0001	0.001452
0.385494202	0.0705	0.0703	0.0002	0.002297
0.403138310	0.0722	0.0720	0.0002	0.002232
0.420704991	0.0738	0.0737	0.0001	0.001437
0.438158900	0.0754	0.0754	0.0000	0.000404
0.455466807	0.0770	0.0770	0.0000	-0.000222
0.472598106	0.0786	0.0786	0.0000	-0.000288

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Unit 1

Page 4

Sample: STONE4
 Operator:
 Submitter:
 Source File: D:\DATA\2020\EVA\STONE4.SMP

Started: 2010-08-18 15:10:05 Analysis Adsorptive: N2
 Completed: 2010-08-18 20:57:59 Analysis Bath: 77.395 K
 Report Time: 2010-12-22 11:55:40 Thermal Correction: No
 Sample Mass: 11.8628 g Equil. Interval: 10 s
 Warm Freespace: 23.4907 cm³ Cold Freespace: 68.4359 cm³

Porosity Distribution by Original Density Functional Theory
 Model: N2 @ 77K on Carbon, Slit Pores
 Method: Non-negative Regularization; No Smoothing

Standard Deviation of Fit: 0.00159, cm³/g

Isotherm Table

Relative Pressure	Experimental Quantity Adsorbed (cm ³ /g STP)	Fitted Quantity Adsorbed (cm ³ /g STP)	Absolute Residual (cm ³ /g STP)	Relative Residual
0.489524394	0.0802	0.0802	0.0000	0.000048
0.506219923	0.0817	0.0817	0.0000	0.000367
0.522661200	0.0833	0.0832	0.0001	0.001192
0.538827309	0.0848	0.0848	-0.0001	-0.000691
0.554699600	0.0863	0.0862	0.0000	0.000141
0.570261598	0.0878	0.0877	0.0002	0.001842
0.585499227	0.0895	0.0895	-0.0001	-0.000614
0.600400090	0.0911	0.0909	0.0002	0.001655
0.614954293	0.0927	0.0929	-0.0001	-0.001436
0.629153311	0.0944	0.0944	0.0000	0.000419
0.642990828	0.0961	0.0959	0.0002	0.001899
0.656461716	0.0978	0.0979	0.0000	-0.000477
0.669562697	0.0997	0.0996	0.0001	0.001199
0.682291925	0.1016	0.1018	-0.0002	-0.001641
0.694648683	0.1035	0.1035	0.0000	0.000286
0.706633508	0.1054	0.1052	0.0002	0.001925
0.718248010	0.1074	0.1076	-0.0002	-0.001403
0.729494929	0.1095	0.1092	0.0002	0.001903
0.740377605	0.1115	0.1117	-0.0002	-0.001904
0.750900388	0.1136	0.1133	0.0003	0.002307
0.761068285	0.1157	0.1159	-0.0002	-0.002052
0.770887017	0.1177	0.1175	0.0003	0.002391
0.780362606	0.1200	0.1210	-0.0009	-0.007760
0.789501607	0.1225	0.1225	0.0000	-0.000036
0.798311174	0.1250	0.1241	0.0010	0.007849
0.806798697	0.1276	0.1280	-0.0004	-0.003235
0.814971626	0.1300	0.1296	0.0004	0.003436
0.822837889	0.1326	0.1331	-0.0005	-0.003976
0.830405474	0.1354	0.1348	0.0006	0.004119
0.837682605	0.1383	0.1389	-0.0006	-0.004241
0.844677329	0.1413	0.1407	0.0006	0.004342
0.851397991	0.1442	0.1448	-0.0005	-0.003726
0.857852995	0.1471	0.1465	0.0006	0.003815
0.864050388	0.1498	0.1504	-0.0006	-0.003821
0.869998574	0.1527	0.1521	0.0006	0.003889
0.875705481	0.1561	0.1571	-0.0010	-0.006446
0.881179392	0.1597	0.1587	0.0010	0.006423

Micromeritics Instrument Corporation

DFT Plus(R) V3.00 (ASAP 2020 V1.05) Unit 1 Page 5

Sample: STONE4
 Operator:
 Submitter:
 Source File: D:\DATA\2020\EVA\STONE4.SMP

Started: 2010-08-18 15:10:05 Analysis Adsorptive: N2
 Completed: 2010-08-18 20:57:59 Analysis Bath: 77.395 K
 Report Time: 2010-12-22 11:55:40 Thermal Correction: No
 Sample Mass: 11.8628 g Equil. Interval: 10 s
 Warm Freespace: 23.4907 cm³ Cold Freespace: 68.4359 cm³

Porosity Distribution by Original Density Functional Theory
 Model: N2 @ 77K on Carbon, Slit Pores
 Method: Non-negative Regularization; No Smoothing

Standard Deviation of Fit: 0.00159, cm³/g

Isotherm Table

Relative Pressure	Experimental Quantity Adsorbed (cm ³ /g STP)	Fitted Quantity Adsorbed (cm ³ /g STP)	Absolute Residual (cm ³ /g STP)	Relative Residual
0.886428118	0.1636	0.1648	-0.0012	-0.007076
0.891459525	0.1675	0.1663	0.0012	0.007017
0.896281302	0.1714	0.1725	-0.0011	-0.006440
0.900909000	0.1753	0.1742	0.0011	0.006389
0.905325770	0.1790	0.1799	-0.0009	-0.005101
0.909563184	0.1825	0.1816	0.0009	0.005077
0.913620114	0.1858	0.1854	0.0005	0.002494
0.917503417	0.1883	0.1872	0.0012	0.006228
0.921219707	0.1898	0.1890	0.0009	0.004486
0.924775481	0.1909	0.1908	0.0001	0.000429
0.928177178	0.1920	0.1927	-0.0007	-0.003577
0.931430817	0.1934	0.1945	-0.0011	-0.005651
0.934542298	0.1955	0.1963	-0.0009	-0.004544
0.937517405	0.1982	0.1981	0.0001	0.000570
0.940361619	0.2018	0.2033	-0.0014	-0.007075
0.943080306	0.2064	0.2050	0.0014	0.006972
0.945678592	0.2120	0.2144	-0.0024	-0.011323
0.948161721	0.2185	0.2161	0.0024	0.011036
0.950534225	0.2260	0.2260	0.0000	0.000028
0.952800930	0.2344	0.2381	-0.0037	-0.015795
0.954966187	0.2437	0.2400	0.0037	0.015240
0.957034409	0.2538	0.2582	-0.0044	-0.017437
0.959009588	0.2646	0.2602	0.0044	0.016768
0.960896015	0.2761	0.2807	-0.0046	-0.016757
0.962697208	0.2873	0.2827	0.0046	0.016139
0.964416981	0.2980	0.3022	-0.0042	-0.014038
0.966058910	0.3082	0.3040	0.0042	0.013599
0.967626274	0.3180	0.3180	0.0000	0.000006
0.969122529	0.3273	0.3308	-0.0036	-0.010850
0.970550597	0.3362	0.3326	0.0036	0.010579
0.971913695	0.3446	0.3478	-0.0031	-0.009036
0.973214507	0.3527	0.3496	0.0031	0.008841
0.974455774	0.3605	0.3631	-0.0027	-0.007410
0.975640416	0.3678	0.3652	0.0027	0.007272
0.976770699	0.3749	0.3749	0.0000	0.000002
0.977849126	0.3816	0.3837	-0.0022	-0.005643
0.978878021	0.3880	0.3858	0.0022	0.005557

Micromeritics Instrument Corporation

DFT Plus(R) V3.00 (ASAP 2020 V1.05) Unit 1 Page 6

Sample: STONE4
 Operator:
 Submitter:
 Source File: D:\DATA\2020\EVA\STONE4.SMP

Started: 2010-08-18 15:10:05 Analysis Adsorptive: N2
 Completed: 2010-08-18 20:57:59 Analysis Bath: 77.395 K
 Report Time: 2010-12-22 11:55:40 Thermal Correction: No
 Sample Mass: 11.8628 g Equil. Interval: 10 s
 Warm Freespace: 23.4907 cm³ Cold Freespace: 68.4359 cm³

Porosity Distribution by Original Density Functional Theory
 Model: N2 @ 77K on Carbon, Slit Pores
 Method: Non-negative Regularization; No Smoothing

Standard Deviation of Fit: 0.00159, cm³/g

Isotherm Table

Relative Pressure	Experimental Quantity Adsorbed (cm ³ /g STP)	Fitted Quantity Adsorbed (cm ³ /g STP)	Absolute Residual (cm ³ /g STP)	Relative Residual
0.979859591	0.3941	0.3960	-0.0019	-0.004855
0.980795979	0.3999	0.3980	0.0019	0.004789
0.981689274	0.4055	0.4055	0.0000	0.000001
0.982541502	0.4108	0.4123	-0.0015	-0.003706
0.983354270	0.4158	0.4143	0.0015	0.003664
0.984129488	0.4206	0.4218	-0.0012	-0.002859
0.984869003	0.4252	0.4240	0.0012	0.002830

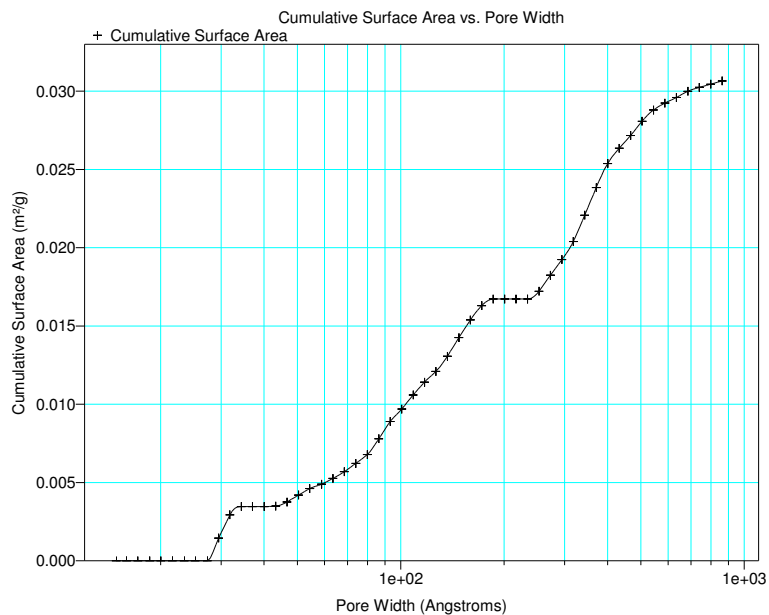
Micromeritics Instrument Corporation

DFT Plus(R) V3.00 (ASAP 2020 V1.05) Unit 1 Page 7

Sample: STONE4
 Operator:
 Submitter:
 Source File: D:\DATA\2020\EVA\STONE4.SMP
 Started: 2010-08-18 15:10:05 Analysis Adsorptive: N2
 Completed: 2010-08-18 20:57:59 Analysis Bath: 77.395 K
 Report Time: 2010-12-22 11:55:40 Thermal Correction: No
 Sample Mass: 11.8628 g Equil. Interval: 10 s
 Warm Freespace: 23.4907 cm³ Cold Freespace: 68.4359 cm³

Porosity Distribution by Original Density Functional Theory
 Model: N2 @ 77K on Carbon, Slit Pores
 Method: Non-negative Regularization; No Smoothing

Volume in Pores <	14.83 Å	:	0.00000 cm ³ /g
Total Volume in Pores <=	862.45 Å	:	0.00037 cm ³ /g
Area in Pores >	862.45 Å	:	0.099 m ² /g
Total Area in Pores >=	14.83 Å	:	0.129 m ² /g



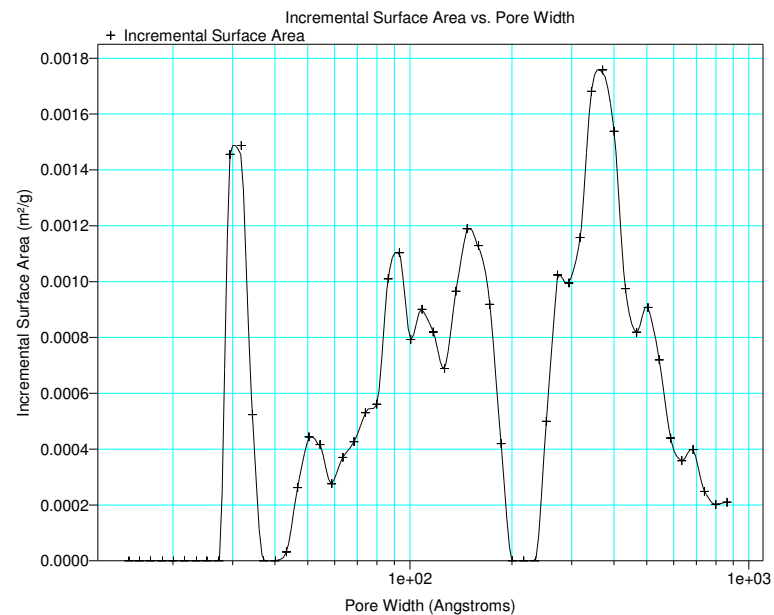
Micromeritics Instrument Corporation

DFT Plus(R) V3.00 (ASAP 2020 V1.05) Unit 1 Page 8

Sample: STONE4
 Operator:
 Submitter:
 Source File: D:\DATA\2020\EVA\STONE4.SMP
 Started: 2010-08-18 15:10:05 Analysis Adsorptive: N2
 Completed: 2010-08-18 20:57:59 Analysis Bath: 77.395 K
 Report Time: 2010-12-22 11:55:40 Thermal Correction: No
 Sample Mass: 11.8628 g Equil. Interval: 10 s
 Warm Freespace: 23.4907 cm³ Cold Freespace: 68.4359 cm³

Porosity Distribution by Original Density Functional Theory
 Model: N2 @ 77K on Carbon, Slit Pores
 Method: Non-negative Regularization; No Smoothing

Volume in Pores <	14.83 Å	:	0.00000 cm ³ /g
Total Volume in Pores <=	862.45 Å	:	0.00037 cm ³ /g
Area in Pores >	862.45 Å	:	0.099 m ² /g
Total Area in Pores >=	14.83 Å	:	0.129 m ² /g



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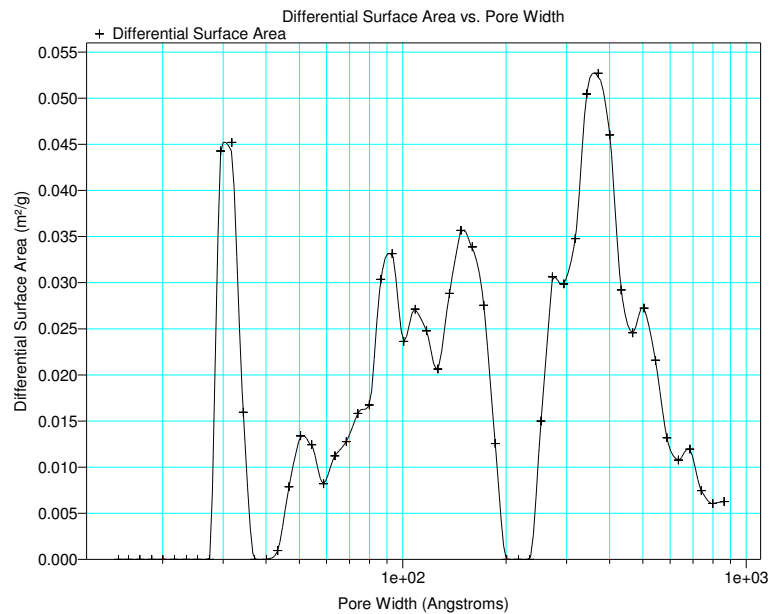
DFT Plus(R) V3.00 (ASAP 2020 V1.05) Unit 1 Page 9

Sample: STONE4
 Operator:
 Submitter:
 Source File: D:\DATA\2020\EVA\STONE4.SMP

Started: 2010-08-18 15:10:05 Analysis Adsorptive: N2
 Completed: 2010-08-18 20:57:59 Analysis Bath: 77.395 K
 Report Time: 2010-12-22 11:55:40 Thermal Correction: No
 Sample Mass: 11.8628 g Equil. Interval: 10 s
 Warm Freespace: 23.4907 cm³ Cold Freespace: 68.4359 cm³

Porosity Distribution by Original Density Functional Theory
 Model: N2 @ 77K on Carbon, Slit Pores
 Method: Non-negative Regularization; No Smoothing

Volume in Pores <	14.83 Å	:	0.00000 cm ³ /g
Total Volume in Pores <=	862.45 Å	:	0.00037 cm ³ /g
Area in Pores >	862.45 Å	:	0.099 m ² /g
Total Area in Pores >=	14.83 Å	:	0.129 m ² /g



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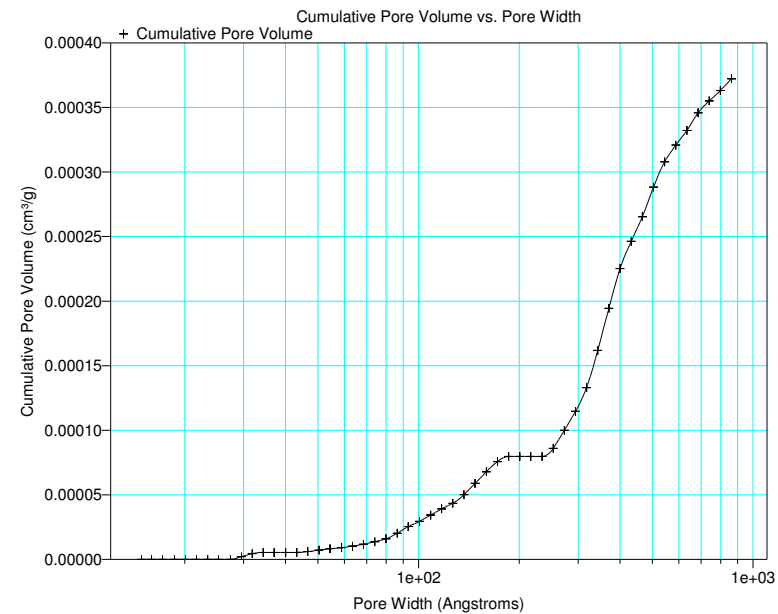
DFT Plus(R) V3.00 (ASAP 2020 V1.05) Unit 1 Page10

Sample: STONE4
 Operator:
 Submitter:
 Source File: D:\DATA\2020\EVA\STONE4.SMP

Started: 2010-08-18 15:10:05 Analysis Adsorptive: N2
 Completed: 2010-08-18 20:57:59 Analysis Bath: 77.395 K
 Report Time: 2010-12-22 11:55:40 Thermal Correction: No
 Sample Mass: 11.8628 g Equil. Interval: 10 s
 Warm Freespace: 23.4907 cm³ Cold Freespace: 68.4359 cm³

Porosity Distribution by Original Density Functional Theory
 Model: N2 @ 77K on Carbon, Slit Pores
 Method: Non-negative Regularization; No Smoothing

Volume in Pores <	14.83 Å	:	0.00000 cm ³ /g
Total Volume in Pores <=	862.45 Å	:	0.00037 cm ³ /g
Area in Pores >	862.45 Å	:	0.099 m ² /g
Total Area in Pores >=	14.83 Å	:	0.129 m ² /g



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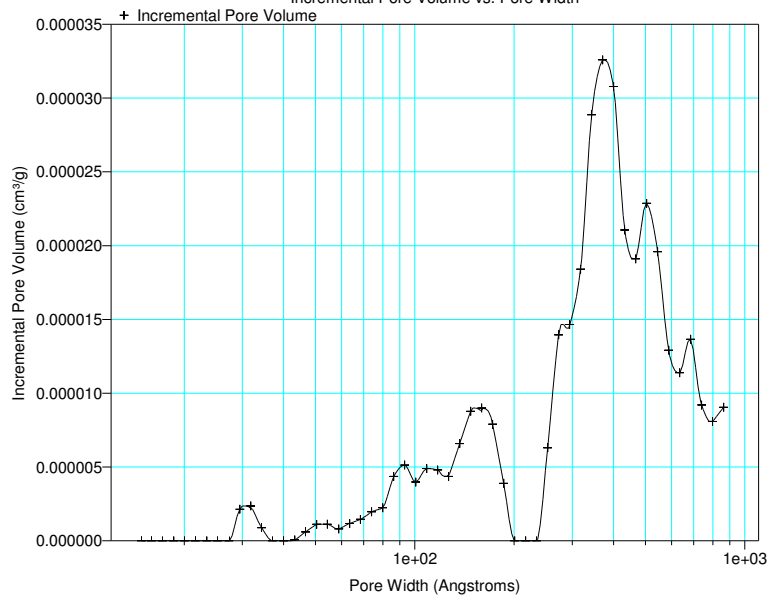
DFT Plus(R) V3.00 (ASAP 2020 V1.05) Unit 1 Page11

Sample: STONE4
 Operator:
 Submitter:
 Source File: D:\DATA\2020\EVA\STONE4.SMP
 Started: 2010-08-18 15:10:05 Analysis Adsorptive: N2
 Completed: 2010-08-18 20:57:59 Analysis Bath: 77.395 K
 Report Time: 2010-12-22 11:55:40 Thermal Correction: No
 Sample Mass: 11.8628 g Equil. Interval: 10 s
 Warm Freespace: 23.4907 cm³ Cold Freespace: 68.4359 cm³

Porosity Distribution by Original Density Functional Theory
 Model: N2 @ 77K on Carbon, Slit Pores
 Method: Non-negative Regularization; No Smoothing

Volume in Pores <	14.83 Å	:	0.00000 cm ³ /g
Total Volume in Pores <=	862.45 Å	:	0.00037 cm ³ /g
Area in Pores >	862.45 Å	:	0.099 m ² /g
Total Area in Pores >=	14.83 Å	:	0.129 m ² /g

Incremental Pore Volume vs. Pore Width



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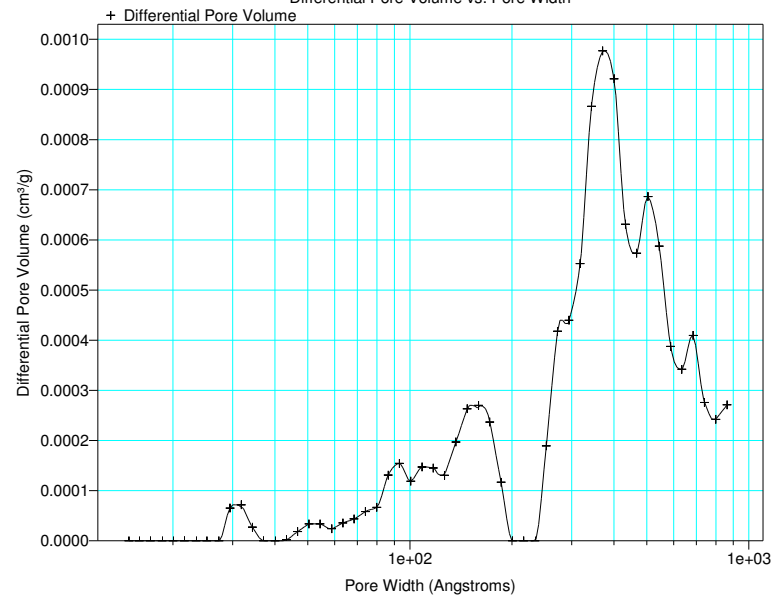
DFT Plus(R) V3.00 (ASAP 2020 V1.05) Unit 1 Page12

Sample: STONE4
 Operator:
 Submitter:
 Source File: D:\DATA\2020\EVA\STONE4.SMP
 Started: 2010-08-18 15:10:05 Analysis Adsorptive: N2
 Completed: 2010-08-18 20:57:59 Analysis Bath: 77.395 K
 Report Time: 2010-12-22 11:55:40 Thermal Correction: No
 Sample Mass: 11.8628 g Equil. Interval: 10 s
 Warm Freespace: 23.4907 cm³ Cold Freespace: 68.4359 cm³

Porosity Distribution by Original Density Functional Theory
 Model: N2 @ 77K on Carbon, Slit Pores
 Method: Non-negative Regularization; No Smoothing

Volume in Pores <	14.83 Å	:	0.00000 cm ³ /g
Total Volume in Pores <=	862.45 Å	:	0.00037 cm ³ /g
Area in Pores >	862.45 Å	:	0.099 m ² /g
Total Area in Pores >=	14.83 Å	:	0.129 m ² /g

Differential Pore Volume vs. Pore Width



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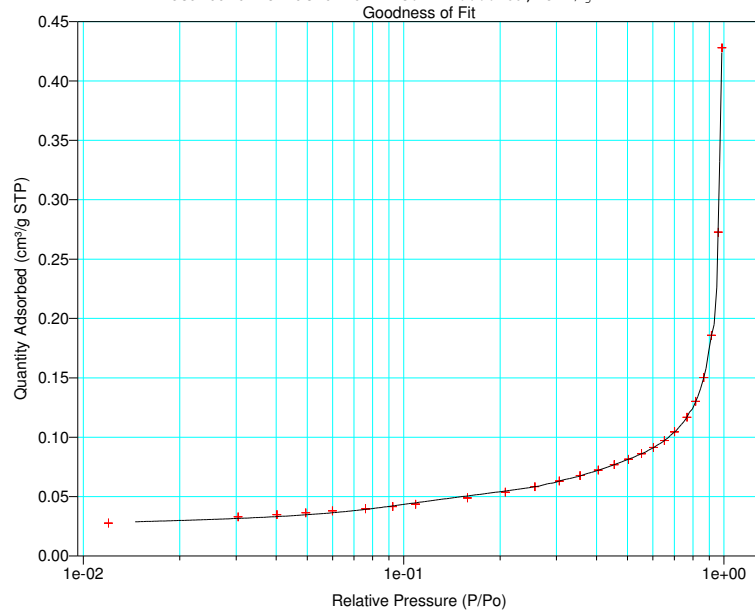
DFT Plus(R) V3.00 (ASAP 2020 V1.05) Unit 1 Page13

Sample: STONE4
 Operator:
 Submitter:
 Source File: D:\DATA\2020\EVA\STONE4.SMP

Started: 2010-08-18 15:10:05 Analysis Adsorptive: N2
 Completed: 2010-08-18 20:57:59 Analysis Bath: 77.395 K
 Report Time: 2010-12-22 11:55:40 Thermal Correction: No
 Sample Mass: 11.8628 g Equil. Interval: 10 s
 Warm Freespace: 23.4907 cm³ Cold Freespace: 68.4359 cm³

Porosity Distribution by Original Density Functional Theory
 Model: N2 @ 77K on Carbon, Slit Pores
 Method: Non-negative Regularization; No Smoothing

Standard Deviation of Fit: 0.00159, cm³/g



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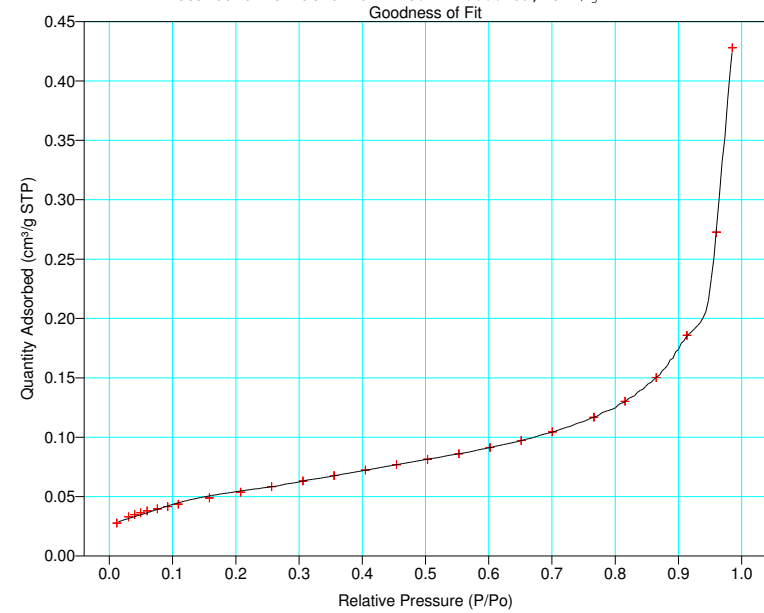
DFT Plus(R) V3.00 (ASAP 2020 V1.05) Unit 1 Page14

Sample: STONE4
 Operator:
 Submitter:
 Source File: D:\DATA\2020\EVA\STONE4.SMP

Started: 2010-08-18 15:10:05 Analysis Adsorptive: N2
 Completed: 2010-08-18 20:57:59 Analysis Bath: 77.395 K
 Report Time: 2010-12-22 11:55:40 Thermal Correction: No
 Sample Mass: 11.8628 g Equil. Interval: 10 s
 Warm Freespace: 23.4907 cm³ Cold Freespace: 68.4359 cm³

Porosity Distribution by Original Density Functional Theory
 Model: N2 @ 77K on Carbon, Slit Pores
 Method: Non-negative Regularization; No Smoothing

Standard Deviation of Fit: 0.00159, cm³/g



A2.18 Pore size distributions (PSD) according to the density functional theory (DFT) (as referenced to in Section 3.2.2) for the M sample size fraction 0.5–1 mm (duplicate)

Micromeritics Instrument Corporation
DFT Plus(R) V3.00 (ASAP 2020 V1.05) Unit 1 Page 1

Sample: AG0.5-1
Operator:
Submitter:
Source File: D:\DATA\2020\EVA\AG0.5-1
Started: 2010-10-27 16:44:56 Analysis Adsorptive: N2
Completed: 2010-10-27 22:42:00 Analysis Bath: 77.420 K
Report Time: 2010-12-22 11:53:03 Thermal Correction: No
Sample Mass: 12.4026 g Equil. Interval: 10 s
Warm Freespace: 22.9376 cm³ Cold Freespace: 67.4384 cm³

Porosity Distribution by Original Density Functional Theory
Model: N2 @ 77K on Carbon, Slit Pores
Method: Non-negative Regularization; No Smoothing

Volume in Pores < 14.83 Å : 0.00001 cm³/g
Total Volume in Pores <= 931.26 Å : 0.00036 cm³/g
Area in Pores > 931.26 Å : 0.091 m²/g
Total Area in Pores >= 14.83 Å : 0.122 m²/g

Pore Size Table

Pore Width (Å)	Cumulative Volume (cm ³ /g)	Incremental Volume (cm ³ /g)	Cumulative Area (m ² /g)	Incremental Area (m ² /g)
14.83	0.00000	0.00000	0.002	0.002
15.91	0.00000	0.00000	0.003	0.001
17.16	0.00000	0.00000	0.003	0.000
18.59	0.00000	0.00000	0.003	0.000
20.02	0.00000	0.00000	0.003	0.000
21.62	0.00000	0.00000	0.003	0.000
23.41	0.00000	0.00000	0.003	0.000
25.20	0.00000	0.00000	0.003	0.000
27.34	0.00000	0.00000	0.003	0.000
29.49	0.00000	0.00000	0.004	0.001
31.81	0.00000	0.00000	0.004	0.000
34.31	0.00000	0.00000	0.004	0.000
36.99	0.00000	0.00000	0.004	0.000
40.03	0.00000	0.00000	0.004	0.000
43.25	0.00000	0.00000	0.004	0.000
46.64	0.00000	0.00000	0.004	0.000
50.40	0.00000	0.00000	0.004	0.000
54.33	0.00001	0.00000	0.004	0.000
58.80	0.00001	0.00000	0.005	0.000
63.44	0.00001	0.00000	0.006	0.001
68.45	0.00001	0.00000	0.006	0.001
73.99	0.00001	0.00000	0.007	0.001
79.88	0.00002	0.00000	0.008	0.001
86.32	0.00002	0.00000	0.009	0.001
93.11	0.00003	0.00001	0.010	0.001
100.61	0.00003	0.00000	0.011	0.001
108.66	0.00004	0.00000	0.012	0.001
117.23	0.00004	0.00000	0.013	0.001
126.53	0.00005	0.00000	0.013	0.001
136.71	0.00005	0.00001	0.014	0.001
147.61	0.00006	0.00001	0.015	0.001
159.41	0.00007	0.00001	0.017	0.001
172.10	0.00008	0.00001	0.017	0.001
185.86	0.00008	0.00000	0.018	0.000

Micromeritics Instrument Corporation
DFT Plus(R) V3.00 (ASAP 2020 V1.05) Unit 1 Page 2

Sample: AG0.5-1
Operator:
Submitter:
Source File: D:\DATA\2020\EVA\AG0.5-1
Started: 2010-10-27 16:44:56 Analysis Adsorptive: N2
Completed: 2010-10-27 22:42:00 Analysis Bath: 77.420 K
Report Time: 2010-12-22 11:53:03 Thermal Correction: No
Sample Mass: 12.4026 g Equil. Interval: 10 s
Warm Freespace: 22.9376 cm³ Cold Freespace: 67.4384 cm³

Porosity Distribution by Original Density Functional Theory
Model: N2 @ 77K on Carbon, Slit Pores
Method: Non-negative Regularization; No Smoothing

Volume in Pores < 14.83 Å : 0.00001 cm³/g
Total Volume in Pores <= 931.26 Å : 0.00036 cm³/g
Area in Pores > 931.26 Å : 0.091 m²/g
Total Area in Pores >= 14.83 Å : 0.122 m²/g

Pore Size Table

Pore Width (Å)	Cumulative Volume (cm ³ /g)	Incremental Volume (cm ³ /g)	Cumulative Area (m ² /g)	Incremental Area (m ² /g)
200.69	0.00008	0.00000	0.018	0.000
216.60	0.00008	0.00000	0.018	0.000
233.93	0.00008	0.00000	0.018	0.000
252.52	0.00008	0.00000	0.018	0.000
272.71	0.00010	0.00001	0.019	0.001
294.51	0.00011	0.00001	0.020	0.001
317.92	0.00012	0.00002	0.021	0.001
343.30	0.00015	0.00003	0.022	0.002
370.64	0.00018	0.00003	0.024	0.002
400.31	0.00021	0.00003	0.025	0.001
432.30	0.00023	0.00002	0.026	0.001
466.79	0.00025	0.00002	0.027	0.001
503.96	0.00027	0.00002	0.028	0.001
544.17	0.00029	0.00002	0.029	0.001
587.60	0.00030	0.00001	0.029	0.000
634.42	0.00031	0.00001	0.030	0.000
684.99	0.00033	0.00001	0.030	0.000
739.68	0.00034	0.00001	0.030	0.000
798.65	0.00034	0.00001	0.030	0.000
862.45	0.00035	0.00001	0.031	0.000
931.26	0.00036	0.00001	0.031	0.000

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DFT Plus(R) V3.00 (ASAP 2020 V1.05) Unit 1 Page 3

Sample: AG0.5-1
 Operator:
 Submitter:
 Source File: D:\DATA\2020\EVA\AG0.5-1

Started: 2010-10-27 16:44:56 Analysis Adsorptive: N2
 Completed: 2010-10-27 22:42:00 Analysis Bath: 77.420 K
 Report Time: 2010-12-22 11:53:03 Thermal Correction: No
 Sample Mass: 12.4026 g Equil. Interval: 10 s
 Warm Freespace: 22.9376 cm³ Cold Freespace: 67.4384 cm³

Porosity Distribution by Original Density Functional Theory
 Model: N2 @ 77K on Carbon, Slit Pores
 Method: Non-negative Regularization; No Smoothing

Standard Deviation of Fit: 0.00146, cm³/g

Isotherm Table

Relative Pressure	Experimental Quantity Adsorbed (cm ³ /g STP)	Fitted Quantity Adsorbed (cm ³ /g STP)	Absolute Residual (cm ³ /g STP)	Relative Residual
0.014515520	0.0305	0.0310	-0.0006	-0.018794
0.017706521	0.0315	0.0321	-0.0006	-0.019286
0.021398440	0.0327	0.0328	-0.0001	-0.003813
0.025631230	0.0339	0.0335	0.0004	0.010861
0.030442240	0.0350	0.0344	0.0006	0.018015
0.035865448	0.0361	0.0352	0.0009	0.024909
0.041930798	0.0372	0.0361	0.0011	0.030076
0.048663601	0.0384	0.0371	0.0013	0.033877
0.056084011	0.0396	0.0383	0.0013	0.033510
0.064206667	0.0407	0.0396	0.0012	0.028416
0.073040441	0.0419	0.0410	0.0009	0.020703
0.082588248	0.0431	0.0426	0.0005	0.011380
0.092847057	0.0444	0.0443	0.0001	0.002105
0.103808001	0.0457	0.0459	-0.0003	-0.006308
0.115456402	0.0469	0.0475	-0.0007	-0.014436
0.127772301	0.0480	0.0490	-0.0010	-0.020027
0.140730694	0.0493	0.0504	-0.0011	-0.022961
0.154301897	0.0505	0.0517	-0.0012	-0.023758
0.168452203	0.0517	0.0529	-0.0012	-0.022759
0.183144197	0.0530	0.0541	-0.0011	-0.019964
0.198337302	0.0544	0.0552	-0.0009	-0.015977
0.213988706	0.0557	0.0563	-0.0006	-0.011357
0.230053306	0.0571	0.0574	-0.0004	-0.006270
0.246484801	0.0584	0.0585	-0.0001	-0.001137
0.263235897	0.0598	0.0596	0.0002	0.003583
0.280259013	0.0612	0.0612	0.0000	0.000475
0.297506303	0.0626	0.0624	0.0003	0.004004
0.314930797	0.0640	0.0636	0.0004	0.006429
0.332486212	0.0654	0.0649	0.0005	0.007804
0.350127310	0.0668	0.0662	0.0006	0.008166
0.367810607	0.0682	0.0677	0.0005	0.007555
0.385494202	0.0696	0.0691	0.0004	0.006018
0.403138310	0.0710	0.0707	0.0003	0.003893
0.420704991	0.0724	0.0723	0.0001	0.001631
0.438158900	0.0738	0.0738	0.0000	-0.000476
0.455466807	0.0752	0.0754	-0.0002	-0.002320
0.472598106	0.0766	0.0769	-0.0003	-0.003882

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DFT Plus(R) V3.00 (ASAP 2020 V1.05) Unit 1 Page 4

Sample: AG0.5-1
 Operator:
 Submitter:
 Source File: D:\DATA\2020\EVA\AG0.5-1

Started: 2010-10-27 16:44:56 Analysis Adsorptive: N2
 Completed: 2010-10-27 22:42:00 Analysis Bath: 77.420 K
 Report Time: 2010-12-22 11:53:03 Thermal Correction: No
 Sample Mass: 12.4026 g Equil. Interval: 10 s
 Warm Freespace: 22.9376 cm³ Cold Freespace: 67.4384 cm³

Porosity Distribution by Original Density Functional Theory
 Model: N2 @ 77K on Carbon, Slit Pores
 Method: Non-negative Regularization; No Smoothing

Standard Deviation of Fit: 0.00146, cm³/g

Isotherm Table

Relative Pressure	Experimental Quantity Adsorbed (cm ³ /g STP)	Fitted Quantity Adsorbed (cm ³ /g STP)	Absolute Residual (cm ³ /g STP)	Relative Residual
0.489524394	0.0779	0.0783	-0.0004	-0.005069
0.506219923	0.0793	0.0797	-0.0005	-0.005822
0.522661209	0.0807	0.0811	-0.0004	-0.005512
0.538827300	0.0821	0.0825	-0.0004	-0.004301
0.554699600	0.0836	0.0838	-0.0002	-0.002838
0.570261598	0.0850	0.0851	-0.0001	-0.000885
0.585499227	0.0866	0.0866	-0.0001	-0.000607
0.600400090	0.0881	0.0880	0.0001	0.001544
0.614954293	0.0897	0.0899	-0.0002	-0.002021
0.629153311	0.0913	0.0913	0.0000	0.000301
0.642990828	0.0930	0.0927	0.0002	0.002495
0.656461716	0.0947	0.0948	-0.0001	-0.001182
0.669562697	0.0965	0.0964	0.0002	0.001817
0.682291925	0.0985	0.0989	-0.0004	-0.003937
0.694648683	0.1005	0.1005	0.0000	0.000175
0.706633508	0.1026	0.1022	0.0004	0.004198
0.718248010	0.1047	0.1050	-0.0003	-0.002617
0.729494929	0.1069	0.1065	0.0003	0.003031
0.740377605	0.1091	0.1094	-0.0003	-0.003000
0.750900388	0.1113	0.1109	0.0004	0.003328
0.761068285	0.1134	0.1138	-0.0003	-0.002934
0.770887017	0.1156	0.1152	0.0004	0.003208
0.780326206	0.1179	0.1188	-0.0010	-0.008084
0.789501607	0.1202	0.1202	0.0000	0.000039
0.798311174	0.1227	0.1217	0.0010	0.008054
0.806798697	0.1251	0.1255	-0.0004	-0.003329
0.814971626	0.1274	0.1270	0.0004	0.003494
0.822837889	0.1298	0.1304	-0.0005	-0.003983
0.830405474	0.1325	0.1319	0.0005	0.004098
0.837682605	0.1353	0.1358	-0.0006	-0.004325
0.844677329	0.1381	0.1375	0.0006	0.004402
0.851397991	0.1409	0.1415	-0.0005	-0.003852
0.857852995	0.1437	0.1431	0.0006	0.003918
0.864050388	0.1463	0.1468	-0.0005	-0.003622
0.869998574	0.1490	0.1484	0.0005	0.003677
0.875705481	0.1521	0.1530	-0.0009	-0.006127
0.881179392	0.1555	0.1545	0.0009	0.006101

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DFT Plus(R) V3.00 (ASAP 2020 V1.05)

Unit 1

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Sample: AG0.5-1
 Operator:
 Submitter:
 Source File: D:\DATA\2020\EVA\AG0.5-1

Started: 2010-10-27 16:44:56 Analysis Adsorptive: N2
 Completed: 2010-10-27 22:42:00 Analysis Bath: 77.420 K
 Report Time: 2010-12-22 11:53:03 Thermal Correction: No
 Sample Mass: 12.4026 g Equil. Interval: 10 s
 Warm Freespace: 22.9376 cm³ Cold Freespace: 67.4384 cm³

Porosity Distribution by Original Density Functional Theory
 Model: N2 @ 77K on Carbon, Slit Pores
 Method: Non-negative Regularization; No Smoothing

Standard Deviation of Fit: 0.00146, cm³/g

Isotherm Table

Relative Pressure	Experimental Quantity Adsorbed (cm ³ /g STP)	Fitted Quantity Adsorbed (cm ³ /g STP)	Absolute Residual (cm ³ /g STP)	Relative Residual
0.886428118	0.1590	0.1601	-0.0011	-0.006800
0.891459525	0.1627	0.1616	0.0011	0.006741
0.896281302	0.1663	0.1674	-0.0010	-0.006247
0.900900900	0.1699	0.1689	0.0011	0.006193
0.905325770	0.1734	0.1743	-0.0009	-0.005002
0.909563184	0.1767	0.1758	0.0009	0.004973
0.913620114	0.1798	0.1794	0.0004	0.002461
0.917503417	0.1824	0.1810	0.0013	0.007279
0.921219707	0.1839	0.1827	0.0011	0.006091
0.924775481	0.1848	0.1845	0.0004	0.001977
0.928177178	0.1857	0.1862	-0.0005	-0.002629
0.931430817	0.1868	0.1879	-0.0011	-0.005780
0.934542298	0.1884	0.1895	-0.0012	-0.006138
0.937517405	0.1906	0.1912	-0.0005	-0.002780
0.940361619	0.1937	0.1948	-0.0012	-0.005978
0.943080306	0.1976	0.1964	0.0012	0.005910
0.945678592	0.2024	0.2045	-0.0021	-0.010189
0.948161721	0.2082	0.2061	0.0021	0.009958
0.950534225	0.2148	0.2148	0.0000	0.000028
0.952800930	0.2223	0.2256	-0.0033	-0.014819
0.954966187	0.2306	0.2273	0.0033	0.014329
0.957034409	0.2397	0.2437	-0.0040	-0.016628
0.959009588	0.2496	0.2456	0.0040	0.016017
0.960896015	0.2600	0.2644	-0.0044	-0.017083
0.962697208	0.2707	0.2663	0.0045	0.016444
0.964416981	0.2809	0.2850	-0.0040	-0.014341
0.966058910	0.2907	0.2867	0.0040	0.013885
0.967626274	0.3000	0.3000	0.0000	0.000007
0.969122529	0.3090	0.3124	-0.0034	-0.011080
0.970550597	0.3175	0.3140	0.0034	0.010800
0.971913695	0.3256	0.3286	-0.0030	-0.009235
0.973214507	0.3333	0.3303	0.0030	0.009034
0.974455774	0.3407	0.3433	-0.0026	-0.007589
0.975640416	0.3478	0.3452	0.0026	0.007445
0.976770699	0.3545	0.3545	0.0000	0.000002
0.977849126	0.3609	0.3630	-0.0021	-0.005795
0.978878021	0.3670	0.3649	0.0021	0.005705

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DFT Plus(R) V3.00 (ASAP 2020 V1.05)

Unit 1

Page 6

Sample: AG0.5-1
 Operator:
 Submitter:
 Source File: D:\DATA\2020\EVA\AG0.5-1

Started: 2010-10-27 16:44:56 Analysis Adsorptive: N2
 Completed: 2010-10-27 22:42:00 Analysis Bath: 77.420 K
 Report Time: 2010-12-22 11:53:03 Thermal Correction: No
 Sample Mass: 12.4026 g Equil. Interval: 10 s
 Warm Freespace: 22.9376 cm³ Cold Freespace: 67.4384 cm³

Porosity Distribution by Original Density Functional Theory
 Model: N2 @ 77K on Carbon, Slit Pores
 Method: Non-negative Regularization; No Smoothing

Standard Deviation of Fit: 0.00146, cm³/g

Isotherm Table

Relative Pressure	Experimental Quantity Adsorbed (cm ³ /g STP)	Fitted Quantity Adsorbed (cm ³ /g STP)	Absolute Residual (cm ³ /g STP)	Relative Residual
0.979859591	0.3729	0.3747	-0.0019	-0.004990
0.980795979	0.3784	0.3766	0.0019	0.004921
0.981689274	0.3838	0.3838	0.0000	0.000001
0.982541502	0.3888	0.3903	-0.0015	-0.003824
0.983354270	0.3937	0.3922	0.0015	0.003780
0.984129488	0.3983	0.3995	-0.0012	-0.002973
0.984869003	0.4027	0.4015	0.0012	0.002942
0.985574186	0.4069	0.4069	0.0000	0.000000

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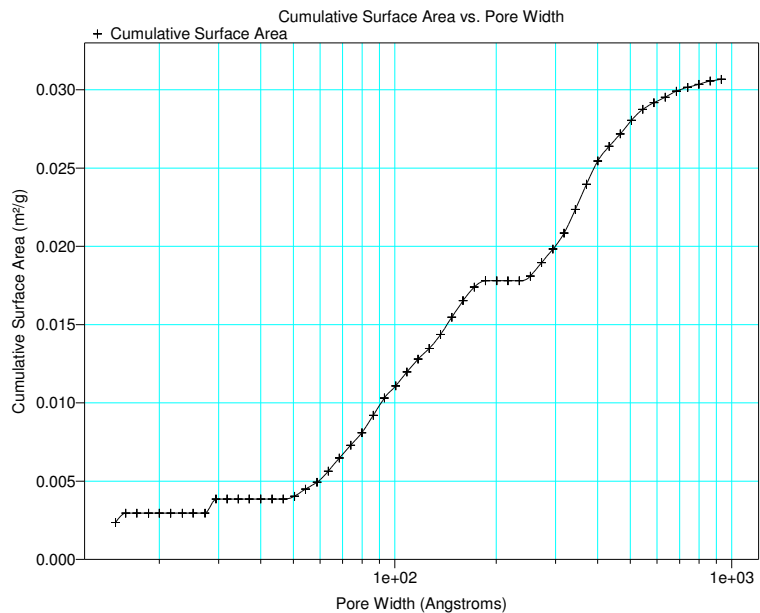
DFT Plus(R) V3.00 (ASAP 2020 V1.05) Unit 1 Page 7

Sample: AG0.5-1
 Operator:
 Submitter:
 Source File: D:\DATA\2020\EVA\AG0.5-1

Started: 2010-10-27 16:44:56 Analysis Adsorptive: N2
 Completed: 2010-10-27 22:42:00 Analysis Bath: 77.420 K
 Report Time: 2010-12-22 11:53:03 Thermal Correction: No
 Sample Mass: 12.4026 g Equil. Interval: 10 s
 Warm Freespace: 22.9376 cm³ Cold Freespace: 67.4384 cm³

Porosity Distribution by Original Density Functional Theory
 Model: N2 @ 77K on Carbon, Slit Pores
 Method: Non-negative Regularization; No Smoothing

Volume in Pores <	14.83 Å	:	0.00001 cm ³ /g
Total Volume in Pores <=	931.26 Å	:	0.00036 cm ³ /g
Area in Pores >	931.26 Å	:	0.091 m ² /g
Total Area in Pores >=	14.83 Å	:	0.122 m ² /g



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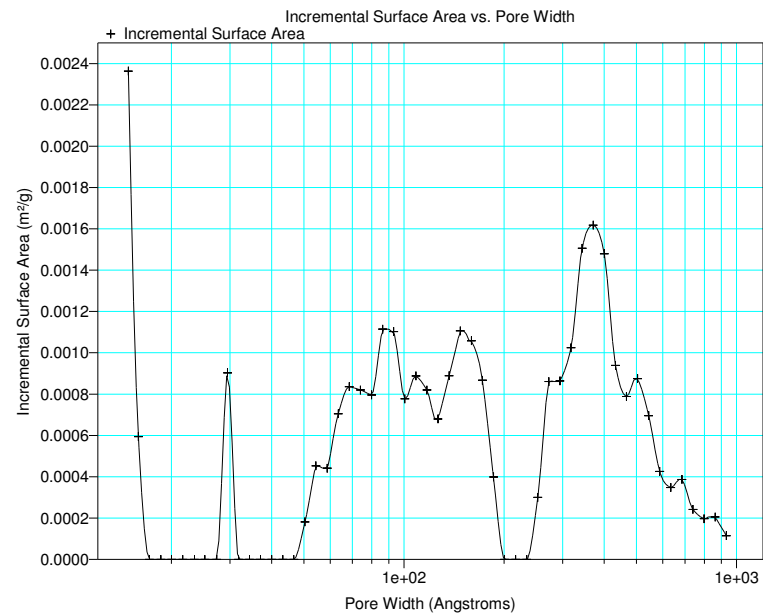
DFT Plus(R) V3.00 (ASAP 2020 V1.05) Unit 1 Page 8

Sample: AG0.5-1
 Operator:
 Submitter:
 Source File: D:\DATA\2020\EVA\AG0.5-1

Started: 2010-10-27 16:44:56 Analysis Adsorptive: N2
 Completed: 2010-10-27 22:42:00 Analysis Bath: 77.420 K
 Report Time: 2010-12-22 11:53:03 Thermal Correction: No
 Sample Mass: 12.4026 g Equil. Interval: 10 s
 Warm Freespace: 22.9376 cm³ Cold Freespace: 67.4384 cm³

Porosity Distribution by Original Density Functional Theory
 Model: N2 @ 77K on Carbon, Slit Pores
 Method: Non-negative Regularization; No Smoothing

Volume in Pores <	14.83 Å	:	0.00001 cm ³ /g
Total Volume in Pores <=	931.26 Å	:	0.00036 cm ³ /g
Area in Pores >	931.26 Å	:	0.091 m ² /g
Total Area in Pores >=	14.83 Å	:	0.122 m ² /g



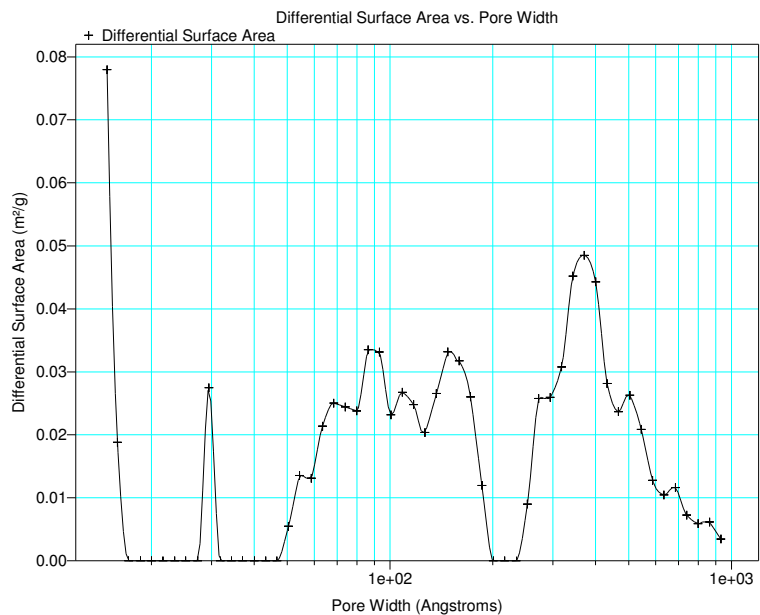
Micromeritics Instrument Corporation

DFT Plus(R) V3.00 (ASAP 2020 V1.05) Unit 1 Page 9

Sample: AG0.5-1
 Operator:
 Submitter:
 Source File: D:\DATA\2020\EVA\AG0.5-1
 Started: 2010-10-27 16:44:56 Analysis Adsorptive: N2
 Completed: 2010-10-27 22:42:00 Analysis Bath: 77.420 K
 Report Time: 2010-12-22 11:53:03 Thermal Correction: No
 Sample Mass: 12.4026 g Equil. Interval: 10 s
 Warm Freespace: 22.9376 cm³ Cold Freespace: 67.4384 cm³

Porosity Distribution by Original Density Functional Theory
 Model: N2 @ 77K on Carbon, Slit Pores
 Method: Non-negative Regularization; No Smoothing

Volume in Pores <	14.83 Å	:	0.00001 cm ³ /g
Total Volume in Pores <=	931.26 Å	:	0.00036 cm ³ /g
Area in Pores >	931.26 Å	:	0.091 m ² /g
Total Area in Pores >=	14.83 Å	:	0.122 m ² /g



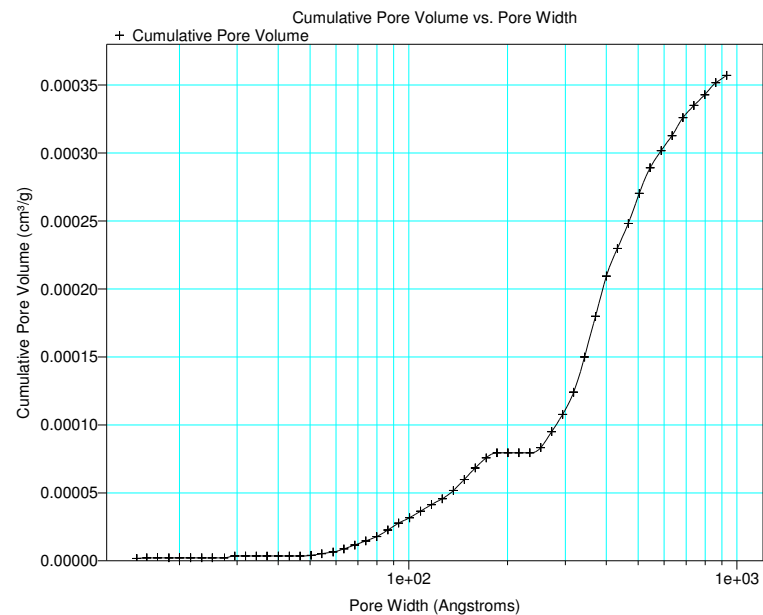
Micromeritics Instrument Corporation

DFT Plus(R) V3.00 (ASAP 2020 V1.05) Unit 1 Page 10

Sample: AG0.5-1
 Operator:
 Submitter:
 Source File: D:\DATA\2020\EVA\AG0.5-1
 Started: 2010-10-27 16:44:56 Analysis Adsorptive: N2
 Completed: 2010-10-27 22:42:00 Analysis Bath: 77.420 K
 Report Time: 2010-12-22 11:53:03 Thermal Correction: No
 Sample Mass: 12.4026 g Equil. Interval: 10 s
 Warm Freespace: 22.9376 cm³ Cold Freespace: 67.4384 cm³

Porosity Distribution by Original Density Functional Theory
 Model: N2 @ 77K on Carbon, Slit Pores
 Method: Non-negative Regularization; No Smoothing

Volume in Pores <	14.83 Å	:	0.00001 cm ³ /g
Total Volume in Pores <=	931.26 Å	:	0.00036 cm ³ /g
Area in Pores >	931.26 Å	:	0.091 m ² /g
Total Area in Pores >=	14.83 Å	:	0.122 m ² /g



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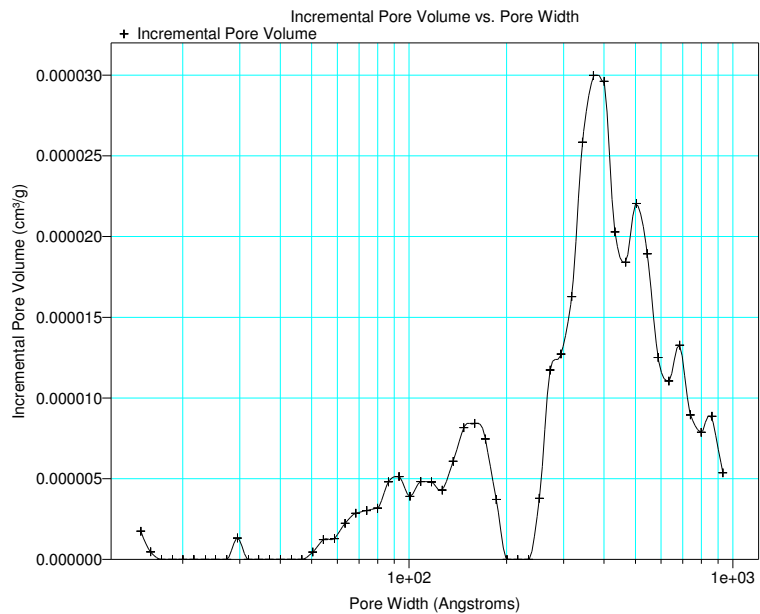
DFT Plus(R) V3.00 (ASAP 2020 V1.05) Unit 1 Page11

Sample: AG0.5-1
 Operator:
 Submitter:
 Source File: D:\DATA\2020\EVA\AG0.5-1

Started: 2010-10-27 16:44:56 Analysis Adsorptive: N2
 Completed: 2010-10-27 22:42:00 Analysis Bath: 77.420 K
 Report Time: 2010-12-22 11:53:03 Thermal Correction: No
 Sample Mass: 12.4026 g Equil. Interval: 10 s
 Warm Freespace: 22.9376 cm³ Cold Freespace: 67.4384 cm³

Porosity Distribution by Original Density Functional Theory
 Model: N2 @ 77K on Carbon, Slit Pores
 Method: Non-negative Regularization; No Smoothing

Volume in Pores <	14.83 Å	:	0.00001 cm ³ /g
Total Volume in Pores <=	931.26 Å	:	0.00036 cm ³ /g
Area in Pores >	931.26 Å	:	0.091 m ² /g
Total Area in Pores >=	14.83 Å	:	0.122 m ² /g



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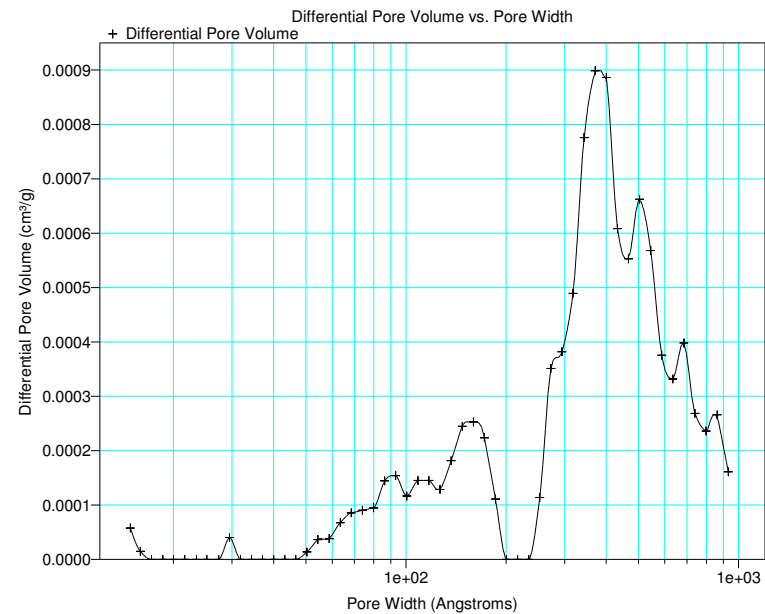
DFT Plus(R) V3.00 (ASAP 2020 V1.05) Unit 1 Page12

Sample: AG0.5-1
 Operator:
 Submitter:
 Source File: D:\DATA\2020\EVA\AG0.5-1

Started: 2010-10-27 16:44:56 Analysis Adsorptive: N2
 Completed: 2010-10-27 22:42:00 Analysis Bath: 77.420 K
 Report Time: 2010-12-22 11:53:03 Thermal Correction: No
 Sample Mass: 12.4026 g Equil. Interval: 10 s
 Warm Freespace: 22.9376 cm³ Cold Freespace: 67.4384 cm³

Porosity Distribution by Original Density Functional Theory
 Model: N2 @ 77K on Carbon, Slit Pores
 Method: Non-negative Regularization; No Smoothing

Volume in Pores <	14.83 Å	:	0.00001 cm ³ /g
Total Volume in Pores <=	931.26 Å	:	0.00036 cm ³ /g
Area in Pores >	931.26 Å	:	0.091 m ² /g
Total Area in Pores >=	14.83 Å	:	0.122 m ² /g



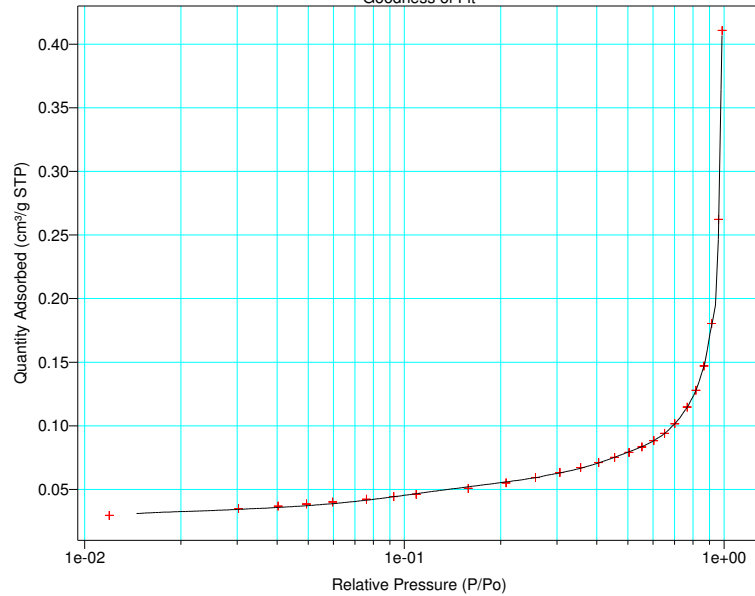
Micromeritics Instrument Corporation

DFT Plus(R) V3.00 (ASAP 2020 V1.05) Unit 1 Page13

Sample: AG0.5-1
 Operator:
 Submitter:
 Source File: D:\DATA\2020\EVA\AG0.5-1
 Started: 2010-10-27 16:44:56 Analysis Adsorptive: N2
 Completed: 2010-10-27 22:42:00 Analysis Bath: 77.420 K
 Report Time: 2010-12-22 11:53:03 Thermal Correction: No
 Sample Mass: 12.4026 g Equil. Interval: 10 s
 Warm Freespace: 22.9376 cm³ Cold Freespace: 67.4384 cm³

Porosity Distribution by Original Density Functional Theory
 Model: N2 @ 77K on Carbon, Slit Pores
 Method: Non-negative Regularization; No Smoothing

Standard Deviation of Fit: 0.00146, cm³/g
 Goodness of Fit



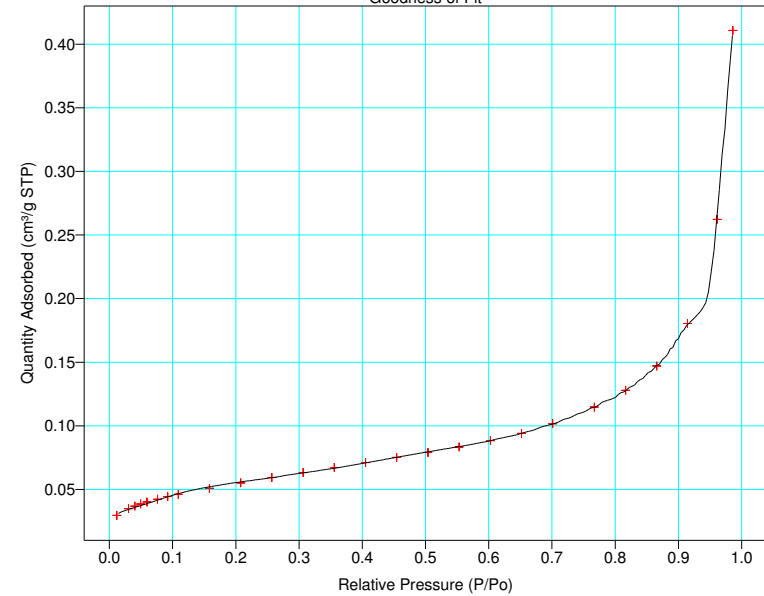
Micromeritics Instrument Corporation

DFT Plus(R) V3.00 (ASAP 2020 V1.05) Unit 1 Page14

Sample: AG0.5-1
 Operator:
 Submitter:
 Source File: D:\DATA\2020\EVA\AG0.5-1
 Started: 2010-10-27 16:44:56 Analysis Adsorptive: N2
 Completed: 2010-10-27 22:42:00 Analysis Bath: 77.420 K
 Report Time: 2010-12-22 11:53:03 Thermal Correction: No
 Sample Mass: 12.4026 g Equil. Interval: 10 s
 Warm Freespace: 22.9376 cm³ Cold Freespace: 67.4384 cm³

Porosity Distribution by Original Density Functional Theory
 Model: N2 @ 77K on Carbon, Slit Pores
 Method: Non-negative Regularization; No Smoothing

Standard Deviation of Fit: 0.00146, cm³/g
 Goodness of Fit



A2.19 Pore size distributions (PSD) according to the density functional theory (DFT) (as referenced to in Section 3.2.2) for the M sample size fraction 1–2 mm

Micromeritics Instrument Corporation
 DFT Plus(R) V3.00 (ASAP 2020 V1.05) Unit 1 Page 1
 Sample: STONE2
 Operator:
 Submitter:
 Source File: D:\DATA\2020\EVA\STONE2.SMP
 Started: 2010-07-01 9:54:31 Analysis Adsorptive: N2
 Completed: 2010-07-01 14:50:49 Analysis Bath: 77.492 K
 Report Time: 2010-12-22 11:55:01 Thermal Correction: No
 Sample Mass: 12.5394 g Equil. Interval: 10 s
 Warm Freespace: 23.3411 cm³ Cold Freespace: 68.4296 cm³

Porosity Distribution by Original Density Functional Theory
 Model: N2 @ 77K on Carbon, Slit Pores
 Method: Non-negative Regularization; No Smoothing

Volume in Pores < 14.83 Å : 0.00001 cm³/g
 Total Volume in Pores <= 862.45 Å : 0.00034 cm³/g
 Area in Pores > 862.45 Å : 0.101 m²/g
 Total Area in Pores >= 14.83 Å : 0.130 m²/g

Pore Size Table

Pore Width (Å)	Cumulative Volume (cm ³ /g)	Incremental Volume (cm ³ /g)	Cumulative Area (m ² /g)	Incremental Area (m ² /g)
14.83	0.00000	0.00000	0.004	0.004
15.91	0.00000	0.00000	0.004	0.000
17.16	0.00000	0.00000	0.004	0.000
18.59	0.00000	0.00000	0.004	0.000
20.02	0.00000	0.00000	0.004	0.000
21.62	0.00000	0.00000	0.004	0.000
23.41	0.00000	0.00000	0.004	0.000
25.20	0.00000	0.00000	0.004	0.000
27.34	0.00000	0.00000	0.004	0.000
29.49	0.00001	0.00000	0.005	0.002
31.81	0.00001	0.00000	0.007	0.001
34.31	0.00001	0.00000	0.007	0.000
36.99	0.00001	0.00000	0.007	0.000
40.03	0.00001	0.00000	0.007	0.000
43.25	0.00001	0.00000	0.007	0.000
46.64	0.00001	0.00000	0.007	0.000
50.40	0.00001	0.00000	0.007	0.000
54.33	0.00001	0.00000	0.007	0.000
58.80	0.00001	0.00000	0.007	0.000
63.44	0.00001	0.00000	0.007	0.000
68.45	0.00001	0.00000	0.007	0.000
73.99	0.00001	0.00000	0.008	0.000
79.88	0.00001	0.00000	0.008	0.000
86.32	0.00002	0.00000	0.009	0.001
93.11	0.00002	0.00000	0.010	0.001
100.61	0.00002	0.00000	0.010	0.001
108.66	0.00003	0.00000	0.011	0.001
117.23	0.00003	0.00000	0.012	0.001
126.53	0.00003	0.00000	0.012	0.001
136.71	0.00004	0.00001	0.013	0.001
147.61	0.00005	0.00001	0.014	0.001
159.41	0.00005	0.00001	0.015	0.001
172.10	0.00006	0.00001	0.016	0.001
185.86	0.00006	0.00000	0.016	0.000

Micromeritics Instrument Corporation
 DFT Plus(R) V3.00 (ASAP 2020 V1.05) Unit 1 Page 2
 Sample: STONE2
 Operator:
 Submitter:
 Source File: D:\DATA\2020\EVA\STONE2.SMP
 Started: 2010-07-01 9:54:31 Analysis Adsorptive: N2
 Completed: 2010-07-01 14:50:49 Analysis Bath: 77.492 K
 Report Time: 2010-12-22 11:55:01 Thermal Correction: No
 Sample Mass: 12.5394 g Equil. Interval: 10 s
 Warm Freespace: 23.3411 cm³ Cold Freespace: 68.4296 cm³

Porosity Distribution by Original Density Functional Theory
 Model: N2 @ 77K on Carbon, Slit Pores
 Method: Non-negative Regularization; No Smoothing

Volume in Pores < 14.83 Å : 0.00001 cm³/g
 Total Volume in Pores <= 862.45 Å : 0.00034 cm³/g
 Area in Pores > 862.45 Å : 0.101 m²/g
 Total Area in Pores >= 14.83 Å : 0.130 m²/g

Pore Size Table

Pore Width (Å)	Cumulative Volume (cm ³ /g)	Incremental Volume (cm ³ /g)	Cumulative Area (m ² /g)	Incremental Area (m ² /g)
200.69	0.00006	0.00000	0.016	0.000
216.60	0.00006	0.00000	0.016	0.000
233.93	0.00006	0.00000	0.016	0.000
252.52	0.00007	0.00000	0.016	0.000
272.71	0.00008	0.00001	0.017	0.001
294.51	0.00009	0.00001	0.018	0.001
317.92	0.00011	0.00002	0.019	0.001
343.30	0.00014	0.00003	0.021	0.002
370.64	0.00017	0.00003	0.022	0.002
400.31	0.00020	0.00003	0.024	0.001
432.30	0.00022	0.00002	0.025	0.001
466.79	0.00023	0.00002	0.025	0.001
503.96	0.00026	0.00002	0.026	0.001
544.17	0.00027	0.00002	0.027	0.001
587.60	0.00029	0.00001	0.027	0.000
634.42	0.00030	0.00001	0.028	0.000
684.99	0.00031	0.00001	0.028	0.000
739.68	0.00032	0.00001	0.028	0.000
798.65	0.00032	0.00001	0.029	0.000
862.45	0.00033	0.00001	0.029	0.000

Micromeritics Instrument Corporation

DFT Plus(R) V3.00 (ASAP 2020 V1.05)

Unit 1

Page 3

Sample: STONE2
 Operator:
 Submitter:
 Source File: D:\DATA\2020\EVA\STONE2.SMP

Started: 2010-07-01 9:54:31 Analysis Adsorptive: N2
 Completed: 2010-07-01 14:50:49 Analysis Bath: 77.492 K
 Report Time: 2010-12-22 11:55:01 Thermal Correction: No
 Sample Mass: 12.5394 g Equil. Interval: 10 s
 Warm Freespace: 23.3411 cm³ Cold Freespace: 68.4296 cm³

Porosity Distribution by Original Density Functional Theory
 Model: N2 @ 77K on Carbon, Slit Pores
 Method: Non-negative Regularization; No Smoothing

Standard Deviation of Fit: 0.00145, cm³/g

Isotherm Table

Relative Pressure	Experimental Quantity Adsorbed (cm ³ /g STP)	Fitted Quantity Adsorbed (cm ³ /g STP)	Absolute Residual (cm ³ /g STP)	Relative Residual
0.011783670	0.0347	0.0351	-0.0004	-0.011638
0.014515520	0.0356	0.0358	-0.0002	-0.004922
0.017706521	0.0367	0.0372	-0.0005	-0.014938
0.021398440	0.0378	0.0379	-0.0001	-0.003896
0.025631230	0.0390	0.0387	0.0003	0.007849
0.030442240	0.0402	0.0395	0.0007	0.017658
0.035865448	0.0415	0.0404	0.0011	0.026188
0.041930798	0.0427	0.0414	0.0013	0.030183
0.048663601	0.0438	0.0425	0.0014	0.031233
0.056084011	0.0450	0.0437	0.0013	0.029559
0.064206667	0.0463	0.0451	0.0012	0.025347
0.073040441	0.0475	0.0466	0.0009	0.018670
0.082588248	0.0488	0.0483	0.0005	0.009662
0.092847057	0.0501	0.0501	0.0000	-0.000004
0.103808001	0.0514	0.0518	-0.0004	-0.008390
0.115456402	0.0527	0.0535	-0.0008	-0.015659
0.127772301	0.0540	0.0551	-0.0011	-0.020394
0.140730694	0.0553	0.0566	-0.0013	-0.022610
0.154301897	0.0567	0.0580	-0.0013	-0.022844
0.168452203	0.0580	0.0593	-0.0012	-0.021431
0.183144197	0.0594	0.0605	-0.0011	-0.018347
0.198337302	0.0608	0.0617	-0.0009	-0.014229
0.213988706	0.0623	0.0629	-0.0006	-0.009659
0.230053306	0.0637	0.0640	-0.0003	-0.004631
0.246484801	0.0652	0.0652	0.0000	0.000600
0.263235897	0.0667	0.0664	0.0004	0.005703
0.280259013	0.0683	0.0684	-0.0001	-0.001065
0.297506303	0.0698	0.0696	0.0002	0.003512
0.314930797	0.0714	0.0715	-0.0001	-0.000996
0.332486212	0.0730	0.0728	0.0002	0.001989
0.350127310	0.0745	0.0743	0.0003	0.003921
0.367810607	0.0761	0.0758	0.0004	0.004799
0.385494202	0.0777	0.0773	0.0004	0.004701
0.403138310	0.0793	0.0790	0.0003	0.003855
0.420704991	0.0808	0.0806	0.0002	0.002506
0.438158900	0.0823	0.0822	0.0001	0.000955
0.455466807	0.0838	0.0839	0.0000	-0.000402

Micromeritics Instrument Corporation

DFT Plus(R) V3.00 (ASAP 2020 V1.05)

Unit 1

Page 4

Sample: STONE2
 Operator:
 Submitter:
 Source File: D:\DATA\2020\EVA\STONE2.SMP

Started: 2010-07-01 9:54:31 Analysis Adsorptive: N2
 Completed: 2010-07-01 14:50:49 Analysis Bath: 77.492 K
 Report Time: 2010-12-22 11:55:01 Thermal Correction: No
 Sample Mass: 12.5394 g Equil. Interval: 10 s
 Warm Freespace: 23.3411 cm³ Cold Freespace: 68.4296 cm³

Porosity Distribution by Original Density Functional Theory
 Model: N2 @ 77K on Carbon, Slit Pores
 Method: Non-negative Regularization; No Smoothing

Standard Deviation of Fit: 0.00145, cm³/g

Isotherm Table

Relative Pressure	Experimental Quantity Adsorbed (cm ³ /g STP)	Fitted Quantity Adsorbed (cm ³ /g STP)	Absolute Residual (cm ³ /g STP)	Relative Residual
0.472598106	0.0853	0.0854	-0.0001	-0.001646
0.489524394	0.0867	0.0870	-0.0002	-0.002632
0.506219923	0.0882	0.0884	-0.0002	-0.002970
0.522661209	0.0897	0.0899	-0.0002	-0.002499
0.538827300	0.0911	0.0913	-0.0001	-0.001630
0.554699600	0.0926	0.0927	-0.0001	-0.000853
0.570261598	0.0941	0.0941	0.0000	-0.000236
0.585499227	0.0955	0.0955	0.0000	0.000213
0.600400090	0.0969	0.0969	0.0000	0.000321
0.614954293	0.0984	0.0985	-0.0001	-0.000793
0.629153311	0.1000	0.1000	0.0000	0.000227
0.642990828	0.1016	0.1015	0.0001	0.001165
0.656461716	0.1033	0.1033	0.0000	-0.000027
0.669562697	0.1050	0.1049	0.0001	0.000518
0.682291925	0.1067	0.1068	0.0000	-0.000380
0.694648683	0.1085	0.1085	0.0000	0.000175
0.706633508	0.1103	0.1102	0.0001	0.000610
0.718248010	0.1121	0.1122	-0.0001	-0.000897
0.729494929	0.1140	0.1139	0.0001	0.001241
0.740377605	0.1160	0.1161	-0.0002	-0.001393
0.750900388	0.1179	0.1177	0.0002	0.001672
0.761068285	0.1199	0.1200	-0.0002	-0.001502
0.770887017	0.1218	0.1216	0.0002	0.001736
0.780362606	0.1239	0.1247	-0.0007	-0.006047
0.789501607	0.1262	0.1262	0.0000	-0.000048
0.798311174	0.1285	0.1277	0.0008	0.006136
0.806798697	0.1309	0.1312	-0.0003	-0.002508
0.814971626	0.1331	0.1328	0.0004	0.002648
0.822837889	0.1355	0.1359	-0.0004	-0.003165
0.830405474	0.1381	0.1376	0.0005	0.003264
0.837682605	0.1408	0.1413	-0.0005	-0.003440
0.844677329	0.1435	0.1430	0.0005	0.003508
0.851397991	0.1463	0.1467	-0.0004	-0.002986
0.857852995	0.1489	0.1485	0.0005	0.003046
0.864050388	0.1515	0.1519	-0.0004	-0.002917
0.869998574	0.1541	0.1536	0.0005	0.002966
0.875705481	0.1571	0.1580	-0.0008	-0.005317

Micromeritics Instrument Corporation

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Sample: STONE2
 Operator:
 Submitter:
 Source File: D:\DATA\2020\EVA\STONE2.SMP

Started: 2010-07-01 9:54:31 Analysis Adsorptive: N2
 Completed: 2010-07-01 14:50:49 Analysis Bath: 77.492 K
 Report Time: 2010-12-22 11:55:01 Thermal Correction: No
 Sample Mass: 12.5394 g Equil. Interval: 10 s
 Warm Freespace: 23.3411 cm³ Cold Freespace: 68.4296 cm³

Porosity Distribution by Original Density Functional Theory
 Model: N2 @ 77K on Carbon, Slit Pores
 Method: Non-negative Regularization; No Smoothing

Standard Deviation of Fit: 0.00145, cm³/g

Isotherm Table

Relative Pressure	Experimental Quantity Adsorbed (cm ³ /g STP)	Fitted Quantity Adsorbed (cm ³ /g STP)	Absolute Residual (cm ³ /g STP)	Relative Residual
0.881179392	0.1605	0.1596	0.0008	0.005296
0.886428118	0.1640	0.1649	-0.0010	-0.005961
0.891459525	0.1675	0.1665	0.0010	0.005911
0.896281302	0.1711	0.1720	-0.0009	-0.005440
0.900900900	0.1746	0.1737	0.0009	0.005396
0.905325770	0.1780	0.1787	-0.0008	-0.004250
0.909563184	0.1812	0.1804	0.0008	0.004228
0.913620114	0.1842	0.1832	0.0010	0.005504
0.917503417	0.1866	0.1850	0.0016	0.008459
0.921219707	0.1880	0.1869	0.0011	0.005997
0.924775481	0.1890	0.1888	0.0002	0.001163
0.928177178	0.1899	0.1906	-0.0007	-0.003733
0.931430817	0.1912	0.1925	-0.0013	-0.006836
0.934542298	0.1930	0.1943	-0.0013	-0.006900
0.937517405	0.1955	0.1961	-0.0006	-0.003083
0.940361619	0.1988	0.2001	-0.0012	-0.006266
0.943080306	0.2031	0.2018	0.0013	0.006185
0.945678592	0.2082	0.2104	-0.0022	-0.010432
0.948161721	0.2143	0.2121	0.0022	0.010184
0.950534225	0.2214	0.2213	0.0000	0.000027
0.952800930	0.2293	0.2327	-0.0034	-0.014890
0.954966187	0.2380	0.2346	0.0034	0.014389
0.957034409	0.2475	0.2516	-0.0041	-0.016582
0.959009588	0.2577	0.2536	0.0041	0.015966
0.960896015	0.2686	0.2729	-0.0044	-0.016288
0.962697208	0.2793	0.2749	0.0044	0.015696
0.964416981	0.2895	0.2935	-0.0040	-0.013648
0.966058910	0.2993	0.2954	0.0040	0.013227
0.967626274	0.3087	0.3087	0.0000	0.000006
0.969122529	0.3176	0.3209	-0.0033	-0.010537
0.970550597	0.3261	0.3228	0.0034	0.010278
0.971913695	0.3342	0.3372	-0.0029	-0.008750
0.973214507	0.3420	0.3391	0.0029	0.008565
0.974455774	0.3494	0.3519	-0.0025	-0.007139
0.975640416	0.3564	0.3539	0.0025	0.007007
0.976770699	0.3632	0.3632	0.0000	0.000002
0.977849126	0.3696	0.3716	-0.0020	-0.005398

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DFT Plus(R) V3.00 (ASAP 2020 V1.05) Unit 1 Page 6

Sample: STONE2
 Operator:
 Submitter:
 Source File: D:\DATA\2020\EVA\STONE2.SMP

Started: 2010-07-01 9:54:31 Analysis Adsorptive: N2
 Completed: 2010-07-01 14:50:49 Analysis Bath: 77.492 K
 Report Time: 2010-12-22 11:55:01 Thermal Correction: No
 Sample Mass: 12.5394 g Equil. Interval: 10 s
 Warm Freespace: 23.3411 cm³ Cold Freespace: 68.4296 cm³

Porosity Distribution by Original Density Functional Theory
 Model: N2 @ 77K on Carbon, Slit Pores
 Method: Non-negative Regularization; No Smoothing

Standard Deviation of Fit: 0.00145, cm³/g

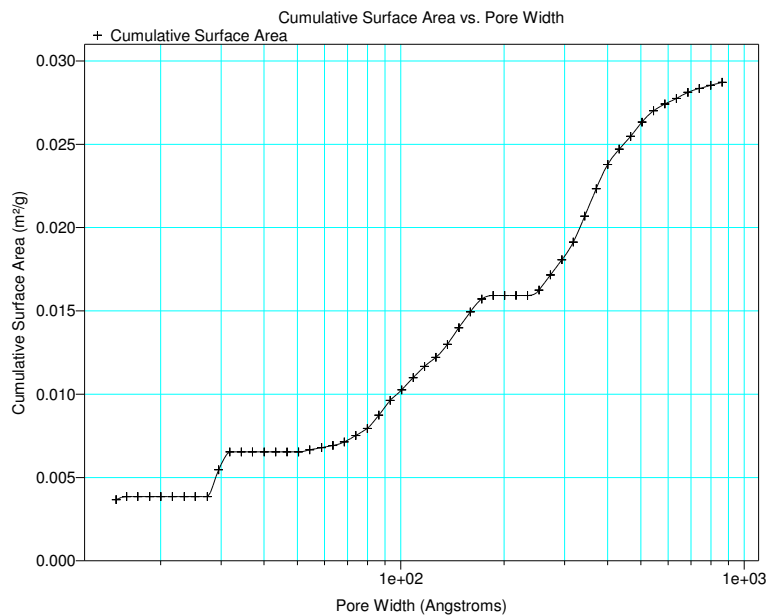
Isotherm Table

Relative Pressure	Experimental Quantity Adsorbed (cm ³ /g STP)	Fitted Quantity Adsorbed (cm ³ /g STP)	Absolute Residual (cm ³ /g STP)	Relative Residual
0.978878021	0.3757	0.3737	0.0020	0.005316
0.979859591	0.3816	0.3834	-0.0018	-0.004633
0.980795979	0.3872	0.3854	0.0018	0.004571
0.981689274	0.3925	0.3925	0.0000	0.000000
0.982541502	0.3976	0.3990	-0.0014	-0.003501
0.983354270	0.4024	0.4010	0.0014	0.003462
0.984129488	0.4070	0.4081	-0.0011	-0.002652
0.984869003	0.4114	0.4104	0.0011	0.002626

Sample: STONE2
 Operator:
 Submitter:
 Source File: D:\DATA\2020\EVA\STONE2.SMP
 Started: 2010-07-01 9:54:31 Analysis Adsorptive: N2
 Completed: 2010-07-01 14:50:49 Analysis Bath: 77.492 K
 Report Time: 2010-12-22 11:55:01 Thermal Correction: No
 Sample Mass: 12.5394 g Equil. Interval: 10 s
 Warm Freespace: 23.3411 cm³ Cold Freespace: 68.4296 cm³

Porosity Distribution by Original Density Functional Theory
 Model: N2 @ 77K on Carbon, Slit Pores
 Method: Non-negative Regularization; No Smoothing

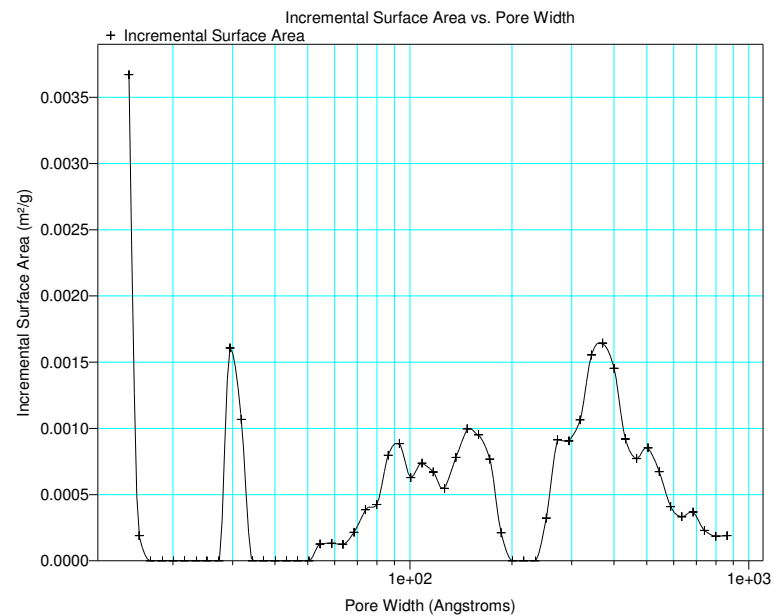
Volume in Pores <	14.83 Å	:	0.00001 cm ³ /g
Total Volume in Pores <=	862.45 Å	:	0.00034 cm ³ /g
Area in Pores >	862.45 Å	:	0.101 m ² /g
Total Area in Pores >=	14.83 Å	:	0.130 m ² /g



Sample: STONE2
 Operator:
 Submitter:
 Source File: D:\DATA\2020\EVA\STONE2.SMP
 Started: 2010-07-01 9:54:31 Analysis Adsorptive: N2
 Completed: 2010-07-01 14:50:49 Analysis Bath: 77.492 K
 Report Time: 2010-12-22 11:55:02 Thermal Correction: No
 Sample Mass: 12.5394 g Equil. Interval: 10 s
 Warm Freespace: 23.3411 cm³ Cold Freespace: 68.4296 cm³

Porosity Distribution by Original Density Functional Theory
 Model: N2 @ 77K on Carbon, Slit Pores
 Method: Non-negative Regularization; No Smoothing

Volume in Pores <	14.83 Å	:	0.00001 cm ³ /g
Total Volume in Pores <=	862.45 Å	:	0.00034 cm ³ /g
Area in Pores >	862.45 Å	:	0.101 m ² /g
Total Area in Pores >=	14.83 Å	:	0.130 m ² /g



Micromeritics Instrument Corporation

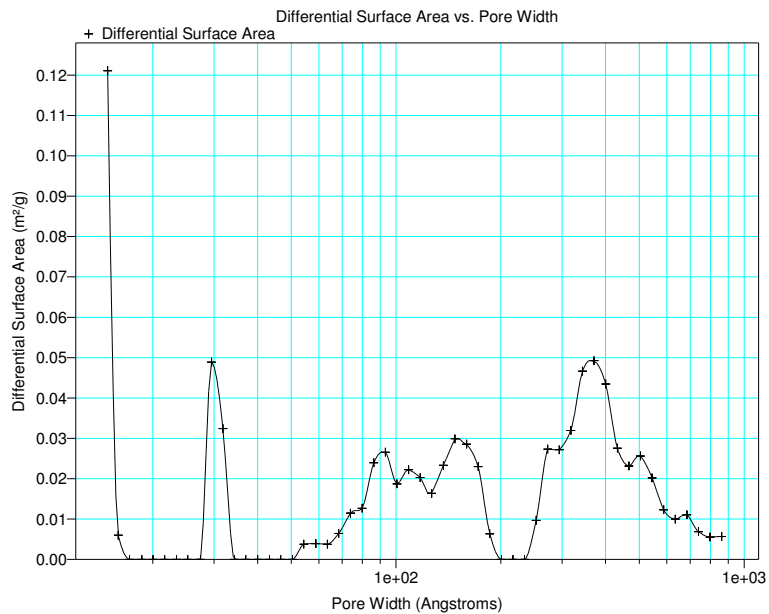
DFT Plus(R) V3.00 (ASAP 2020 V1.05) Unit 1 Page 9

Sample: STONE2
 Operator:
 Submitter:
 Source File: D:\DATA\2020\EVA\STONE2.SMP

Started: 2010-07-01 9:54:31 Analysis Adsorptive: N2
 Completed: 2010-07-01 14:50:49 Analysis Bath: 77.492 K
 Report Time: 2010-12-22 11:55:02 Thermal Correction: No
 Sample Mass: 12.5394 g Equil. Interval: 10 s
 Warm Freespace: 23.3411 cm³ Cold Freespace: 68.4296 cm³

Porosity Distribution by Original Density Functional Theory
 Model: N2 @ 77K on Carbon, Slit Pores
 Method: Non-negative Regularization; No Smoothing

Volume in Pores <	14.83 Å	:	0.00001 cm ³ /g
Total Volume in Pores <=	862.45 Å	:	0.00034 cm ³ /g
Area in Pores >	862.45 Å	:	0.101 m ² /g
Total Area in Pores >=	14.83 Å	:	0.130 m ² /g



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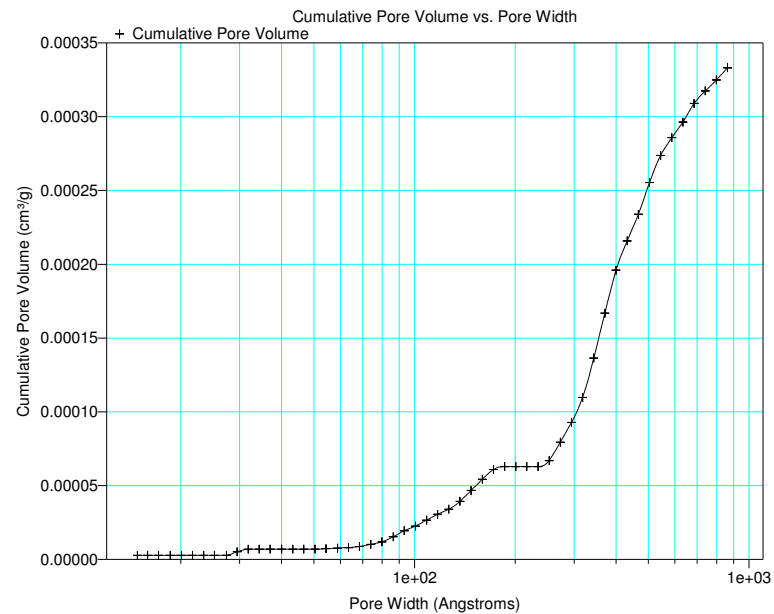
DFT Plus(R) V3.00 (ASAP 2020 V1.05) Unit 1 Page 10

Sample: STONE2
 Operator:
 Submitter:
 Source File: D:\DATA\2020\EVA\STONE2.SMP

Started: 2010-07-01 9:54:31 Analysis Adsorptive: N2
 Completed: 2010-07-01 14:50:49 Analysis Bath: 77.492 K
 Report Time: 2010-12-22 11:55:02 Thermal Correction: No
 Sample Mass: 12.5394 g Equil. Interval: 10 s
 Warm Freespace: 23.3411 cm³ Cold Freespace: 68.4296 cm³

Porosity Distribution by Original Density Functional Theory
 Model: N2 @ 77K on Carbon, Slit Pores
 Method: Non-negative Regularization; No Smoothing

Volume in Pores <	14.83 Å	:	0.00001 cm ³ /g
Total Volume in Pores <=	862.45 Å	:	0.00034 cm ³ /g
Area in Pores >	862.45 Å	:	0.101 m ² /g
Total Area in Pores >=	14.83 Å	:	0.130 m ² /g



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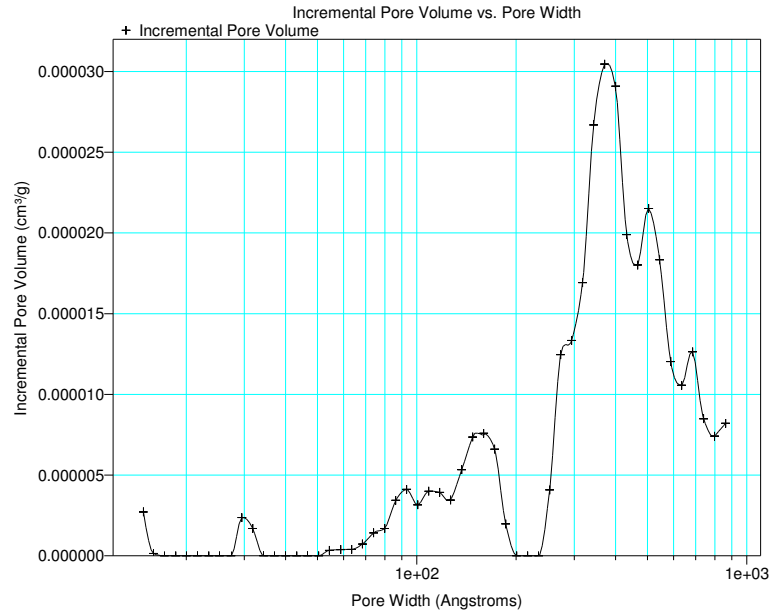
DFT Plus(R) V3.00 (ASAP 2020 V1.05) Unit 1 Page11

Sample: STONE2
Operator:
Submitter:
Source File: D:\DATA\2020\EVA\STONE2.SMP

Started: 2010-07-01 9:54:31 Analysis Adsorptive: N2
Completed: 2010-07-01 14:50:49 Analysis Bath: 77.492 K
Report Time: 2010-12-22 11:55:02 Thermal Correction: No
Sample Mass: 12.5394 g Equil. Interval: 10 s
Warm Freespace: 23.3411 cm³ Cold Freespace: 68.4296 cm³

Porosity Distribution by Original Density Functional Theory
Model: N2 @ 77K on Carbon, Slit Pores
Method: Non-negative Regularization; No Smoothing

Volume in Pores < 14.83 Å : 0.00001 cm³/g
Total Volume in Pores <= 862.45 Å : 0.00034 cm³/g
Area in Pores > 862.45 Å : 0.101 m²/g
Total Area in Pores >= 14.83 Å : 0.130 m²/g



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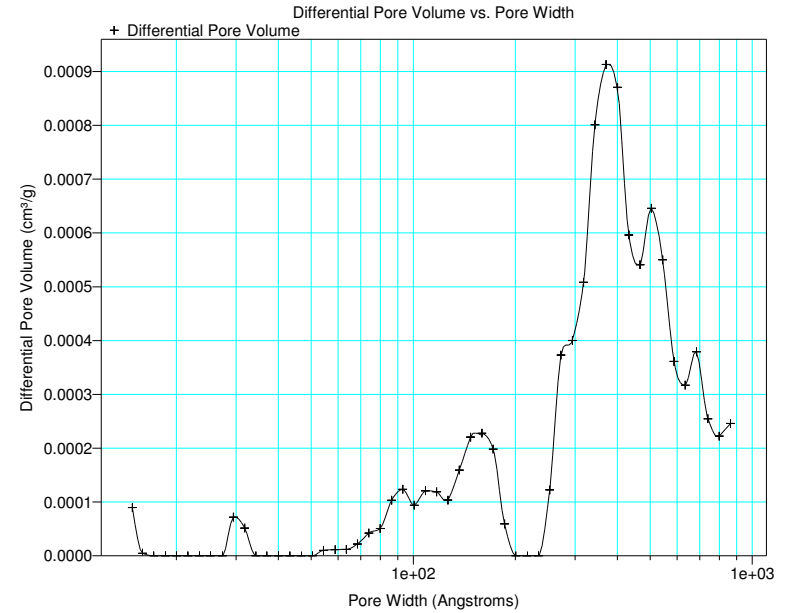
DFT Plus(R) V3.00 (ASAP 2020 V1.05) Unit 1 Page12

Sample: STONE2
Operator:
Submitter:
Source File: D:\DATA\2020\EVA\STONE2.SMP

Started: 2010-07-01 9:54:31 Analysis Adsorptive: N2
Completed: 2010-07-01 14:50:49 Analysis Bath: 77.492 K
Report Time: 2010-12-22 11:55:02 Thermal Correction: No
Sample Mass: 12.5394 g Equil. Interval: 10 s
Warm Freespace: 23.3411 cm³ Cold Freespace: 68.4296 cm³

Porosity Distribution by Original Density Functional Theory
Model: N2 @ 77K on Carbon, Slit Pores
Method: Non-negative Regularization; No Smoothing

Volume in Pores < 14.83 Å : 0.00001 cm³/g
Total Volume in Pores <= 862.45 Å : 0.00034 cm³/g
Area in Pores > 862.45 Å : 0.101 m²/g
Total Area in Pores >= 14.83 Å : 0.130 m²/g



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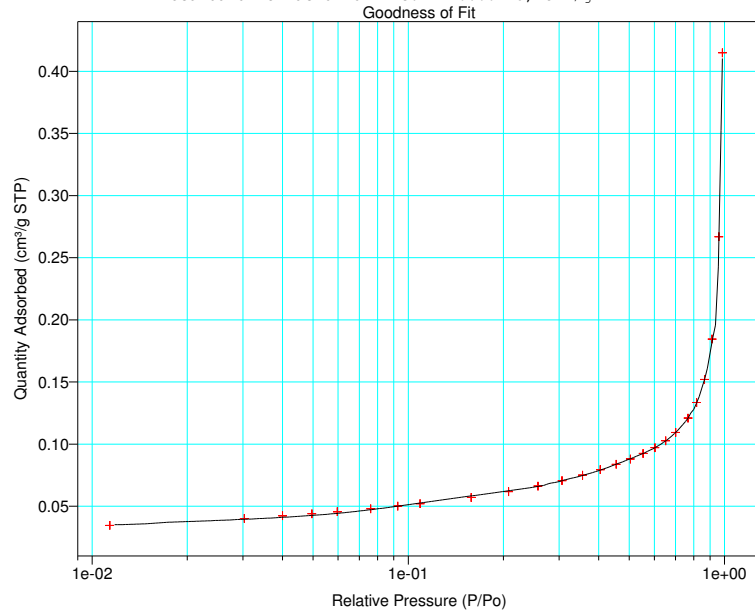
DFT Plus(R) V3.00 (ASAP 2020 V1.05) Unit 1 Page13

Sample: STONE2
 Operator:
 Submitter:
 Source File: D:\DATA\2020\EVA\STONE2.SMP

Started: 2010-07-01 9:54:31 Analysis Adsorptive: N2
 Completed: 2010-07-01 14:50:49 Analysis Bath: 77.492 K
 Report Time: 2010-12-22 11:55:02 Thermal Correction: No
 Sample Mass: 12.5394 g Equil. Interval: 10 s
 Warm Freespace: 23.3411 cm³ Cold Freespace: 68.4296 cm³

Porosity Distribution by Original Density Functional Theory
 Model: N2 @ 77K on Carbon, Slit Pores
 Method: Non-negative Regularization; No Smoothing

Standard Deviation of Fit: 0.00145, cm³/g



Micromeritics Instrument Corporation

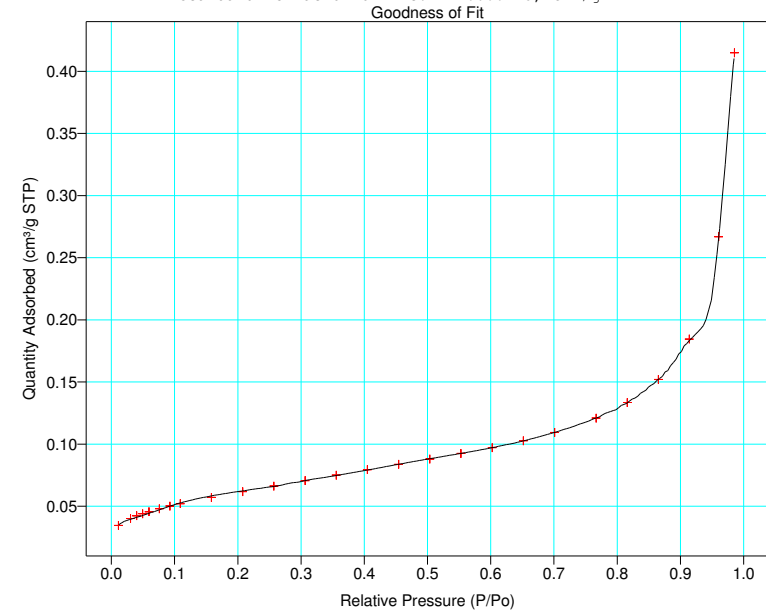
DFT Plus(R) V3.00 (ASAP 2020 V1.05) Unit 1 Page14

Sample: STONE2
 Operator:
 Submitter:
 Source File: D:\DATA\2020\EVA\STONE2.SMP

Started: 2010-07-01 9:54:31 Analysis Adsorptive: N2
 Completed: 2010-07-01 14:50:49 Analysis Bath: 77.492 K
 Report Time: 2010-12-22 11:55:02 Thermal Correction: No
 Sample Mass: 12.5394 g Equil. Interval: 10 s
 Warm Freespace: 23.3411 cm³ Cold Freespace: 68.4296 cm³

Porosity Distribution by Original Density Functional Theory
 Model: N2 @ 77K on Carbon, Slit Pores
 Method: Non-negative Regularization; No Smoothing

Standard Deviation of Fit: 0.00145, cm³/g



A2.20 Pore size distributions (PSD) according to the density functional theory (DFT) (as referenced to in Section 3.2.2) for the M sample size fraction 2–3 mm

Micromeritics Instrument Corporation
DFT Plus(R) V3.00 (ASAP 2020 V1.05) Unit 1 Page 1

Sample: STONE6
Operator:
Submitter:
Source File: D:\DATA\2020\EVA\STONE6.SMP
Started: 2010-08-26 9:13:17 Analysis Adsorptive: N2
Completed: 2010-08-26 13:13:33 Analysis Bath: 77.409 K
Report Time: 2010-12-22 11:56:14 Thermal Correction: No
Sample Mass: 13.0402 g Equil. Interval: 10 s
Warm Freespace: 23.1536 cm³ Cold Freespace: 68.7163 cm³

Porosity Distribution by Original Density Functional Theory
Model: N2 @ 77K on Carbon, Slit Pores
Method: Non-negative Regularization; No Smoothing

Volume in Pores	<	14.83 Å	:	0.00003 cm ³ /g
Total Volume in Pores	<=	931.26 Å	:	0.00044 cm ³ /g
Area in Pores	>	931.26 Å	:	0.000 m ² /g
Total Area in Pores	>=	14.83 Å	:	0.039 m ² /g

Pore Size Table

Pore Width (Å)	Cumulative Volume (cm ³ /g)	Incremental Volume (cm ³ /g)	Cumulative Area (m ² /g)	Incremental Area (m ² /g)
14.83	0.00000	0.00000	0.004	0.004
15.91	0.00001	0.00000	0.008	0.005
17.16	0.00001	0.00000	0.010	0.002
18.59	0.00001	0.00000	0.010	0.000
20.02	0.00001	0.00000	0.010	0.000
21.62	0.00001	0.00000	0.010	0.000
23.41	0.00001	0.00000	0.010	0.000
25.20	0.00001	0.00000	0.010	0.000
27.34	0.00001	0.00000	0.010	0.000
29.49	0.00001	0.00000	0.010	0.000
31.81	0.00001	0.00000	0.010	0.000
34.31	0.00001	0.00000	0.010	0.000
36.99	0.00001	0.00000	0.010	0.000
40.03	0.00001	0.00000	0.010	0.000
43.25	0.00001	0.00000	0.010	0.000
46.64	0.00001	0.00000	0.010	0.000
50.40	0.00001	0.00000	0.010	0.000
54.33	0.00001	0.00000	0.010	0.000
58.80	0.00001	0.00000	0.010	0.000
63.44	0.00001	0.00000	0.010	0.000
68.45	0.00001	0.00000	0.010	0.000
73.99	0.00001	0.00000	0.011	0.000
79.88	0.00001	0.00000	0.011	0.001
86.32	0.00002	0.00001	0.013	0.001
93.11	0.00002	0.00001	0.014	0.001
100.61	0.00003	0.00001	0.015	0.001
108.66	0.00004	0.00001	0.016	0.001
117.23	0.00004	0.00001	0.017	0.001
126.53	0.00005	0.00001	0.018	0.001
136.71	0.00006	0.00001	0.020	0.001
147.61	0.00007	0.00001	0.021	0.001
159.41	0.00008	0.00001	0.022	0.001
172.10	0.00009	0.00001	0.023	0.001
185.86	0.00009	0.00001	0.024	0.001

Micromeritics Instrument Corporation
DFT Plus(R) V3.00 (ASAP 2020 V1.05) Unit 1 Page 2

Sample: STONE6
Operator:
Submitter:
Source File: D:\DATA\2020\EVA\STONE6.SMP
Started: 2010-08-26 9:13:17 Analysis Adsorptive: N2
Completed: 2010-08-26 13:13:33 Analysis Bath: 77.409 K
Report Time: 2010-12-22 11:56:14 Thermal Correction: No
Sample Mass: 13.0402 g Equil. Interval: 10 s
Warm Freespace: 23.1536 cm³ Cold Freespace: 68.7163 cm³

Porosity Distribution by Original Density Functional Theory
Model: N2 @ 77K on Carbon, Slit Pores
Method: Non-negative Regularization; No Smoothing

Volume in Pores	<	14.83 Å	:	0.00003 cm ³ /g
Total Volume in Pores	<=	931.26 Å	:	0.00044 cm ³ /g
Area in Pores	>	931.26 Å	:	0.000 m ² /g
Total Area in Pores	>=	14.83 Å	:	0.039 m ² /g

Pore Size Table

Pore Width (Å)	Cumulative Volume (cm ³ /g)	Incremental Volume (cm ³ /g)	Cumulative Area (m ² /g)	Incremental Area (m ² /g)
200.69	0.00010	0.00000	0.024	0.000
216.60	0.00010	0.00000	0.025	0.000
233.93	0.00010	0.00000	0.025	0.000
252.52	0.00011	0.00001	0.026	0.001
272.71	0.00013	0.00001	0.027	0.001
294.51	0.00014	0.00001	0.028	0.001
317.92	0.00016	0.00002	0.029	0.001
343.30	0.00018	0.00003	0.030	0.002
370.64	0.00021	0.00003	0.032	0.002
400.31	0.00024	0.00003	0.033	0.001
432.30	0.00026	0.00002	0.034	0.001
466.79	0.00028	0.00002	0.035	0.001
503.96	0.00030	0.00002	0.036	0.001
544.17	0.00032	0.00002	0.037	0.001
587.60	0.00034	0.00001	0.037	0.000
634.42	0.00035	0.00001	0.037	0.000
684.99	0.00037	0.00002	0.038	0.000
739.68	0.00038	0.00001	0.038	0.000
798.65	0.00039	0.00001	0.038	0.000
862.45	0.00040	0.00001	0.039	0.000
931.26	0.00041	0.00001	0.039	0.000

Micromeritics Instrument Corporation

DFT Plus(R) V3.00 (ASAP 2020 V1.05) Unit 1 Page 3

Sample: STONE6
 Operator:
 Submitter:
 Source File: D:\DATA\2020\EVA\STONE6.SMP

Started: 2010-08-26 9:13:17 Analysis Adsorptive: N2
 Completed: 2010-08-26 13:13:33 Analysis Bath: 77.409 K
 Report Time: 2010-12-22 11:56:14 Thermal Correction: No
 Sample Mass: 13.0402 g Equil. Interval: 10 s
 Warm Freespace: 23.1536 cm³ Cold Freespace: 68.7163 cm³

Porosity Distribution by Original Density Functional Theory
 Model: N2 @ 77K on Carbon, Slit Pores
 Method: Non-negative Regularization; No Smoothing

Standard Deviation of Fit: 0.00165, cm³/g

Isotherm Table

Relative Pressure	Experimental Quantity Adsorbed (cm ³ /g STP)	Fitted Quantity Adsorbed (cm ³ /g STP)	Absolute Residual (cm ³ /g STP)	Relative Residual
0.011783670	0.0321	0.0330	-0.0009	-0.028583
0.014515520	0.0328	0.0333	-0.0005	-0.016223
0.017706521	0.0335	0.0343	-0.0007	-0.022295
0.021398440	0.0343	0.0346	-0.0002	-0.006940
0.025631230	0.0352	0.0349	0.0003	0.008423
0.030442240	0.0360	0.0362	-0.0001	-0.003856
0.035865448	0.0368	0.0365	0.0003	0.008680
0.041930798	0.0376	0.0374	0.0002	0.005253
0.048663601	0.0384	0.0378	0.0006	0.015455
0.056084011	0.0390	0.0382	0.0008	0.021142
0.064206667	0.0396	0.0386	0.0010	0.025114
0.073040441	0.0402	0.0390	0.0011	0.028538
0.082588248	0.0407	0.0395	0.0012	0.029667
0.092847057	0.0412	0.0400	0.0013	0.030385
0.103808001	0.0418	0.0404	0.0013	0.031831
0.115456402	0.0422	0.0409	0.0014	0.032400
0.127772301	0.0426	0.0413	0.0013	0.031659
0.140730694	0.0430	0.0417	0.0013	0.030030
0.154301897	0.0432	0.0420	0.0012	0.027992
0.168452203	0.0435	0.0424	0.0011	0.026226
0.183144197	0.0438	0.0427	0.0011	0.024998
0.198337302	0.0441	0.0430	0.0011	0.023953
0.213988706	0.0443	0.0433	0.0010	0.022746
0.230053306	0.0446	0.0436	0.0010	0.021670
0.246484801	0.0449	0.0439	0.0009	0.020739
0.263235897	0.0451	0.0442	0.0009	0.019830
0.280259013	0.0454	0.0445	0.0009	0.018881
0.297506303	0.0457	0.0448	0.0008	0.017786
0.314930797	0.0459	0.0452	0.0008	0.016379
0.332486212	0.0462	0.0455	0.0007	0.014359
0.350127310	0.0464	0.0459	0.0005	0.011756
0.367810607	0.0466	0.0462	0.0004	0.008639
0.385494202	0.0468	0.0466	0.0002	0.004973
0.403138310	0.0470	0.0470	0.0000	0.000881
0.420704991	0.0472	0.0474	-0.0002	-0.003549
0.438158900	0.0474	0.0478	-0.0004	-0.008219
0.455466807	0.0476	0.0482	-0.0006	-0.012893

Micromeritics Instrument Corporation

DFT Plus(R) V3.00 (ASAP 2020 V1.05) Unit 1 Page 4

Sample: STONE6
 Operator:
 Submitter:
 Source File: D:\DATA\2020\EVA\STONE6.SMP

Started: 2010-08-26 9:13:17 Analysis Adsorptive: N2
 Completed: 2010-08-26 13:13:33 Analysis Bath: 77.409 K
 Report Time: 2010-12-22 11:56:14 Thermal Correction: No
 Sample Mass: 13.0402 g Equil. Interval: 10 s
 Warm Freespace: 23.1536 cm³ Cold Freespace: 68.7163 cm³

Porosity Distribution by Original Density Functional Theory
 Model: N2 @ 77K on Carbon, Slit Pores
 Method: Non-negative Regularization; No Smoothing

Standard Deviation of Fit: 0.00165, cm³/g

Isotherm Table

Relative Pressure	Experimental Quantity Adsorbed (cm ³ /g STP)	Fitted Quantity Adsorbed (cm ³ /g STP)	Absolute Residual (cm ³ /g STP)	Relative Residual
0.472598106	0.0477	0.0486	-0.0009	-0.017989
0.489524394	0.0478	0.0489	-0.0011	-0.023235
0.506219923	0.0480	0.0493	-0.0013	-0.027694
0.522661209	0.0482	0.0496	-0.0015	-0.030826
0.538827300	0.0484	0.0500	-0.0016	-0.033039
0.554699600	0.0486	0.0503	-0.0017	-0.034873
0.570261598	0.0489	0.0507	-0.0018	-0.036157
0.585499227	0.0492	0.0510	-0.0018	-0.036845
0.600400090	0.0495	0.0513	-0.0018	-0.037298
0.614954293	0.0498	0.0517	-0.0019	-0.037200
0.629153311	0.0502	0.0520	-0.0018	-0.035858
0.642990828	0.0507	0.0524	-0.0017	-0.033724
0.656461716	0.0512	0.0528	-0.0016	-0.031029
0.669562697	0.0518	0.0532	-0.0014	-0.026478
0.682291925	0.0525	0.0536	-0.0011	-0.020748
0.694648683	0.0532	0.0540	-0.0008	-0.014904
0.706633508	0.0539	0.0544	-0.0005	-0.009507
0.718248010	0.0546	0.0548	-0.0002	-0.003278
0.729494929	0.0554	0.0552	0.0002	0.003866
0.740377605	0.0562	0.0563	-0.0001	-0.001084
0.750900388	0.0571	0.0567	0.0004	0.007408
0.761068285	0.0580	0.0581	-0.0001	-0.002081
0.770887707	0.0589	0.0584	0.0004	0.007484
0.780362606	0.0601	0.0611	-0.0010	-0.017268
0.789501607	0.0615	0.0614	0.0001	0.000880
0.798311174	0.0631	0.0618	0.0013	0.020108
0.806798697	0.0647	0.0651	-0.0005	-0.007458
0.814971626	0.0662	0.0655	0.0007	0.011052
0.822837889	0.0678	0.0684	-0.0006	-0.009012
0.830405474	0.0696	0.0688	0.0008	0.011930
0.837682605	0.0715	0.0722	-0.0007	-0.009933
0.844677329	0.0735	0.0726	0.0009	0.012289
0.851397991	0.0754	0.0762	-0.0007	-0.009351
0.857852995	0.0774	0.0765	0.0009	0.011342
0.864050388	0.0792	0.0799	-0.0007	-0.008962
0.869998574	0.0811	0.0802	0.0009	0.010667
0.875705481	0.0834	0.0844	-0.0011	-0.012736

Micromeritics Instrument Corporation

DFT Plus(R) V3.00 (ASAP 2020 V1.05)

Unit 1

Page 5

Sample: STONE6
 Operator:
 Submitter:
 Source File: D:\DATA\2020\EVA\STONE6.SMP

Started: 2010-08-26 9:13:17 Analysis Adsorptive: N2
 Completed: 2010-08-26 13:13:33 Analysis Bath: 77.409 K
 Report Time: 2010-12-22 11:56:14 Thermal Correction: No
 Sample Mass: 13.0402 g Equil. Interval: 10 s
 Warm Freespace: 23.1536 cm³ Cold Freespace: 68.7163 cm³

Porosity Distribution by Original Density Functional Theory
 Model: N2 @ 77K on Carbon, Slit Pores
 Method: Non-negative Regularization; No Smoothing

Standard Deviation of Fit: 0.00165, cm³/g

Isotherm Table

Relative Pressure	Experimental Quantity Adsorbed (cm ³ /g STP)	Fitted Quantity Adsorbed (cm ³ /g STP)	Absolute Residual (cm ³ /g STP)	Relative Residual
0.881179392	0.0859	0.0847	0.0012	0.013963
0.886428118	0.0886	0.0899	-0.0012	-0.013624
0.891459525	0.0915	0.0901	0.0013	0.014558
0.896281302	0.0943	0.0955	-0.0012	-0.012791
0.900900900	0.0971	0.0957	0.0013	0.013562
0.905325770	0.0997	0.1009	-0.0011	-0.011123
0.909563184	0.1023	0.1011	0.0012	0.011813
0.913620114	0.1047	0.1056	-0.0008	-0.007842
0.917503417	0.1067	0.1058	0.0009	0.008523
0.921219707	0.1079	0.1081	-0.0002	-0.001915
0.924775481	0.1086	0.1083	0.0003	0.002615
0.928177178	0.1093	0.1096	-0.0003	-0.002629
0.931430817	0.1102	0.1099	0.0004	0.003251
0.934542298	0.1115	0.1123	-0.0008	-0.007010
0.937517405	0.1134	0.1125	0.0008	0.007464
0.940361619	0.1159	0.1174	-0.0015	-0.012757
0.943080306	0.1191	0.1176	0.0015	0.012913
0.945678592	0.1231	0.1254	-0.0022	-0.018185
0.948161721	0.1279	0.1256	0.0023	0.017943
0.950534225	0.1333	0.1333	0.0000	0.000346
0.952800930	0.1395	0.1429	-0.0033	-0.023774
0.954966187	0.1464	0.1430	0.0034	0.022980
0.957034409	0.1539	0.1579	-0.0039	-0.025539
0.959009588	0.1620	0.1580	0.0040	0.024535
0.960896015	0.1706	0.1749	-0.0043	-0.025326
0.962697208	0.1795	0.1751	0.0044	0.024303
0.964416981	0.1879	0.1919	-0.0040	-0.021074
0.966058910	0.1960	0.1920	0.0040	0.020386
0.967626274	0.2037	0.2037	0.0000	0.000133
0.969122529	0.2111	0.2145	-0.0035	-0.016361
0.970550597	0.2181	0.2146	0.0035	0.015964
0.971913695	0.2248	0.2279	-0.0031	-0.014003
0.973214507	0.2312	0.2280	0.0032	0.013726
0.974455774	0.2373	0.2402	-0.0029	-0.012087
0.975640416	0.2431	0.2402	0.0029	0.011893
0.976770699	0.2487	0.2487	0.0000	0.000073
0.977849126	0.2540	0.2565	-0.0025	-0.009827

Micromeritics Instrument Corporation

DFT Plus(R) V3.00 (ASAP 2020 V1.05)

Unit 1

Page 6

Sample: STONE6
 Operator:
 Submitter:
 Source File: D:\DATA\2020\EVA\STONE6.SMP

Started: 2010-08-26 9:13:17 Analysis Adsorptive: N2
 Completed: 2010-08-26 13:13:33 Analysis Bath: 77.409 K
 Report Time: 2010-12-22 11:56:14 Thermal Correction: No
 Sample Mass: 13.0402 g Equil. Interval: 10 s
 Warm Freespace: 23.1536 cm³ Cold Freespace: 68.7163 cm³

Porosity Distribution by Original Density Functional Theory
 Model: N2 @ 77K on Carbon, Slit Pores
 Method: Non-negative Regularization; No Smoothing

Standard Deviation of Fit: 0.00165, cm³/g

Isotherm Table

Relative Pressure	Experimental Quantity Adsorbed (cm ³ /g STP)	Fitted Quantity Adsorbed (cm ³ /g STP)	Absolute Residual (cm ³ /g STP)	Relative Residual
0.978878021	0.2591	0.2565	0.0025	0.009709
0.979859591	0.2639	0.2662	-0.0023	-0.008623
0.980795979	0.2685	0.2662	0.0023	0.008538
0.981689274	0.2729	0.2729	0.0000	0.000050
0.982541502	0.2771	0.2791	-0.0020	-0.007142
0.983354270	0.2811	0.2791	0.0020	0.007090
0.984129488	0.2849	0.2867	-0.0018	-0.006327
0.984869003	0.2885	0.2867	0.0018	0.006292
0.985574186	0.2920	0.2936	-0.0016	-0.005416
0.986246824	0.2953	0.2936	0.0017	0.005803

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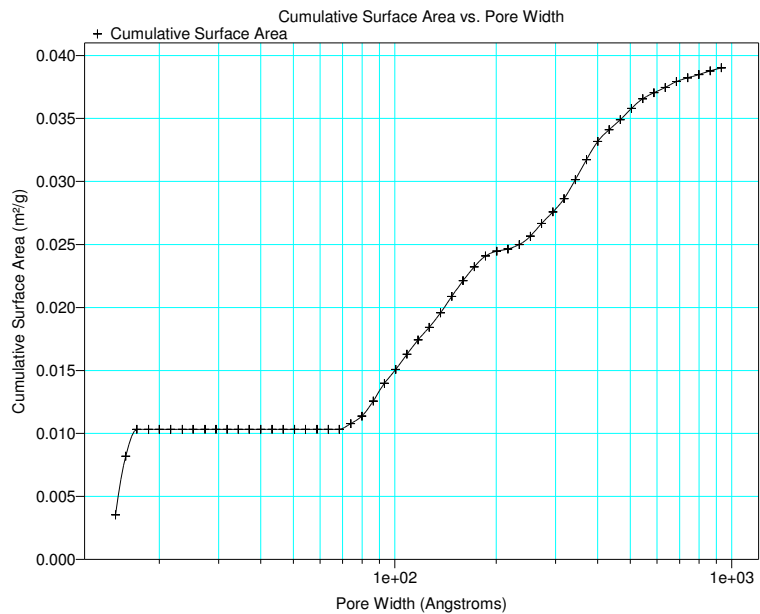
DFT Plus(R) V3.00 (ASAP 2020 V1.05) Unit 1 Page 7

Sample: STONE6
 Operator:
 Submitter:
 Source File: D:\DATA\2020\EVA\STONE6.SMP

Started: 2010-08-26 9:13:17 Analysis Adsorptive: N2
 Completed: 2010-08-26 13:13:33 Analysis Bath: 77.409 K
 Report Time: 2010-12-22 11:56:14 Thermal Correction: No
 Sample Mass: 13.0402 g Equil. Interval: 10 s
 Warm Freespace: 23.1536 cm³ Cold Freespace: 68.7163 cm³

Porosity Distribution by Original Density Functional Theory
 Model: N2 @ 77K on Carbon, Slit Pores
 Method: Non-negative Regularization; No Smoothing

Volume in Pores <	14.83 Å	:	0.00003 cm ³ /g
Total Volume in Pores <=	931.26 Å	:	0.00044 cm ³ /g
Area in Pores >	931.26 Å	:	0.000 m ² /g
Total Area in Pores >=	14.83 Å	:	0.039 m ² /g



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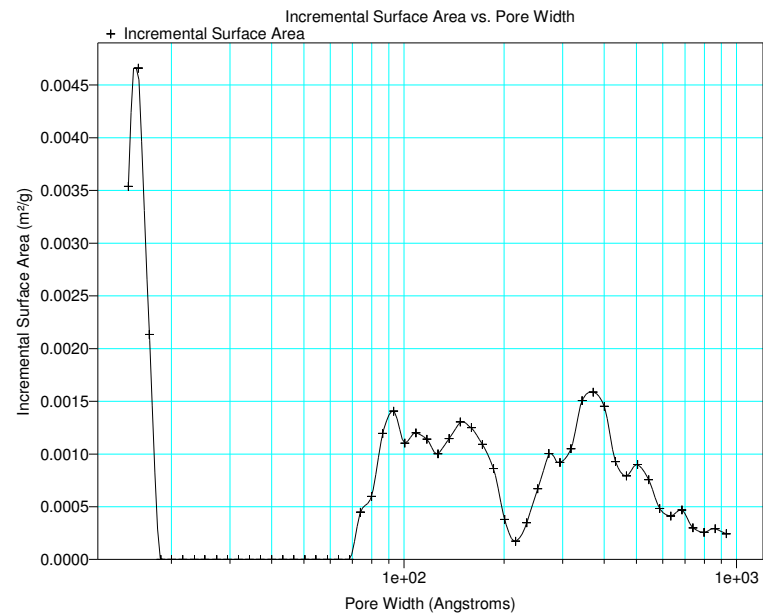
DFT Plus(R) V3.00 (ASAP 2020 V1.05) Unit 1 Page 8

Sample: STONE6
 Operator:
 Submitter:
 Source File: D:\DATA\2020\EVA\STONE6.SMP

Started: 2010-08-26 9:13:17 Analysis Adsorptive: N2
 Completed: 2010-08-26 13:13:33 Analysis Bath: 77.409 K
 Report Time: 2010-12-22 11:56:14 Thermal Correction: No
 Sample Mass: 13.0402 g Equil. Interval: 10 s
 Warm Freespace: 23.1536 cm³ Cold Freespace: 68.7163 cm³

Porosity Distribution by Original Density Functional Theory
 Model: N2 @ 77K on Carbon, Slit Pores
 Method: Non-negative Regularization; No Smoothing

Volume in Pores <	14.83 Å	:	0.00003 cm ³ /g
Total Volume in Pores <=	931.26 Å	:	0.00044 cm ³ /g
Area in Pores >	931.26 Å	:	0.000 m ² /g
Total Area in Pores >=	14.83 Å	:	0.039 m ² /g



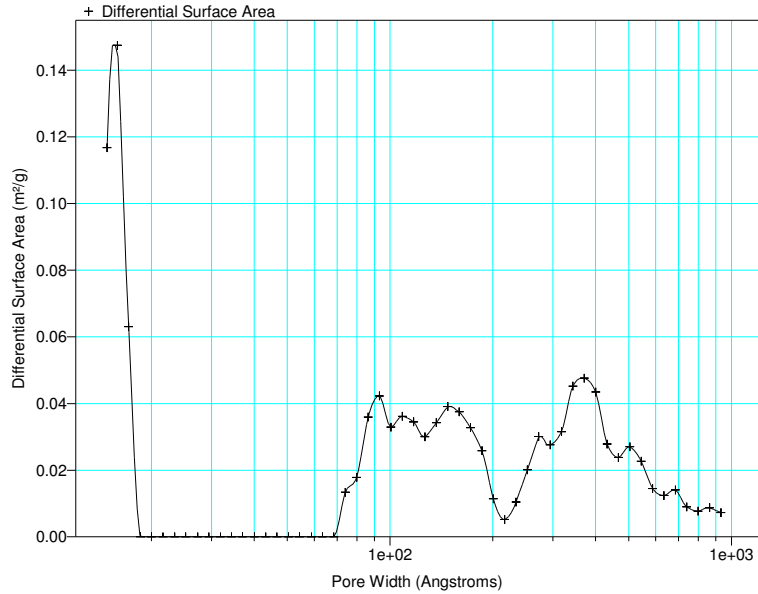
Sample: STONE6
 Operator:
 Submitter:
 Source File: D:\DATA\2020\EVA\STONE6.SMP

Started: 2010-08-26 9:13:17 Analysis Adsorptive: N2
 Completed: 2010-08-26 13:13:33 Analysis Bath: 77.409 K
 Report Time: 2010-12-22 11:56:14 Thermal Correction: No
 Sample Mass: 13.0402 g Equil. Interval: 10 s
 Warm Freespace: 23.1536 cm³ Cold Freespace: 68.7163 cm³

Porosity Distribution by Original Density Functional Theory
 Model: N2 @ 77K on Carbon, Slit Pores
 Method: Non-negative Regularization; No Smoothing

Volume in Pores <	14.83 Å	:	0.00003 cm ³ /g
Total Volume in Pores <=	931.26 Å	:	0.00044 cm ³ /g
Area in Pores >	931.26 Å	:	0.000 m ² /g
Total Area in Pores >=	14.83 Å	:	0.039 m ² /g

Differential Surface Area vs. Pore Width



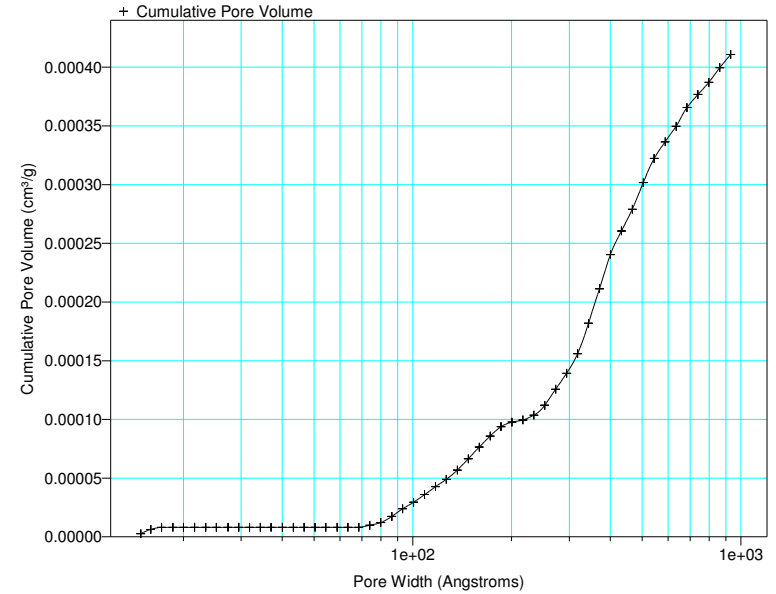
Sample: STONE6
 Operator:
 Submitter:
 Source File: D:\DATA\2020\EVA\STONE6.SMP

Started: 2010-08-26 9:13:17 Analysis Adsorptive: N2
 Completed: 2010-08-26 13:13:33 Analysis Bath: 77.409 K
 Report Time: 2010-12-22 11:56:14 Thermal Correction: No
 Sample Mass: 13.0402 g Equil. Interval: 10 s
 Warm Freespace: 23.1536 cm³ Cold Freespace: 68.7163 cm³

Porosity Distribution by Original Density Functional Theory
 Model: N2 @ 77K on Carbon, Slit Pores
 Method: Non-negative Regularization; No Smoothing

Volume in Pores <	14.83 Å	:	0.00003 cm ³ /g
Total Volume in Pores <=	931.26 Å	:	0.00044 cm ³ /g
Area in Pores >	931.26 Å	:	0.000 m ² /g
Total Area in Pores >=	14.83 Å	:	0.039 m ² /g

Cumulative Pore Volume vs. Pore Width



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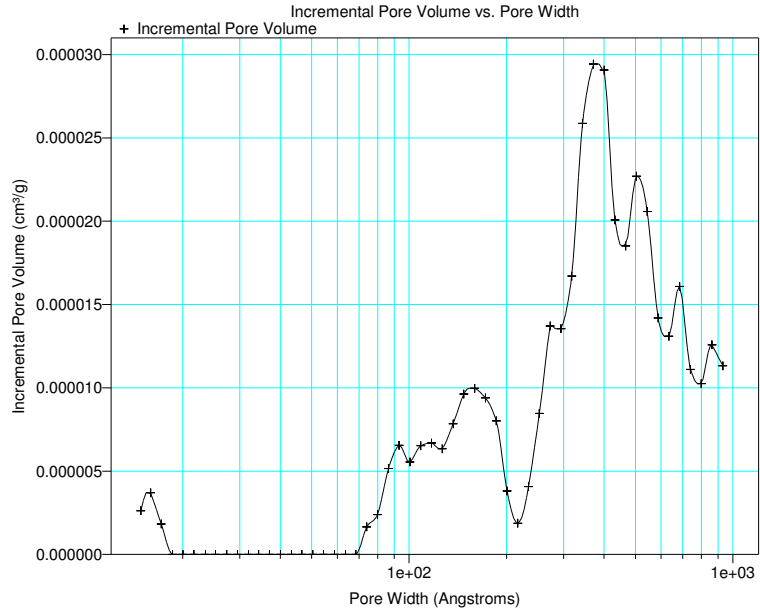
DFT Plus(R) V3.00 (ASAP 2020 V1.05) Unit 1 Page11

Sample: STONE6
 Operator:
 Submitter:
 Source File: D:\DATA\2020\EVA\STONE6.SMP

Started: 2010-08-26 9:13:17 Analysis Adsorptive: N2
 Completed: 2010-08-26 13:13:33 Analysis Bath: 77.409 K
 Report Time: 2010-12-22 11:56:14 Thermal Correction: No
 Sample Mass: 13.0402 g Equil. Interval: 10 s
 Warm Freespace: 23.1536 cm³ Cold Freespace: 68.7163 cm³

Porosity Distribution by Original Density Functional Theory
 Model: N2 @ 77K on Carbon, Slit Pores
 Method: Non-negative Regularization; No Smoothing

Volume in Pores <	14.83 Å	:	0.00003 cm ³ /g
Total Volume in Pores <=	931.26 Å	:	0.00044 cm ³ /g
Area in Pores >	931.26 Å	:	0.000 m ² /g
Total Area in Pores >=	14.83 Å	:	0.039 m ² /g



Micromeritics Instrument Corporation

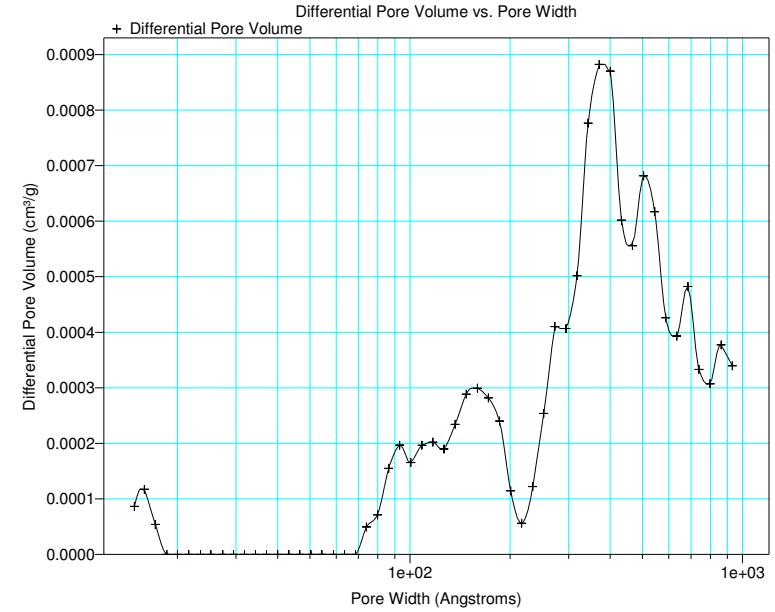
DFT Plus(R) V3.00 (ASAP 2020 V1.05) Unit 1 Page12

Sample: STONE6
 Operator:
 Submitter:
 Source File: D:\DATA\2020\EVA\STONE6.SMP

Started: 2010-08-26 9:13:17 Analysis Adsorptive: N2
 Completed: 2010-08-26 13:13:33 Analysis Bath: 77.409 K
 Report Time: 2010-12-22 11:56:14 Thermal Correction: No
 Sample Mass: 13.0402 g Equil. Interval: 10 s
 Warm Freespace: 23.1536 cm³ Cold Freespace: 68.7163 cm³

Porosity Distribution by Original Density Functional Theory
 Model: N2 @ 77K on Carbon, Slit Pores
 Method: Non-negative Regularization; No Smoothing

Volume in Pores <	14.83 Å	:	0.00003 cm ³ /g
Total Volume in Pores <=	931.26 Å	:	0.00044 cm ³ /g
Area in Pores >	931.26 Å	:	0.000 m ² /g
Total Area in Pores >=	14.83 Å	:	0.039 m ² /g



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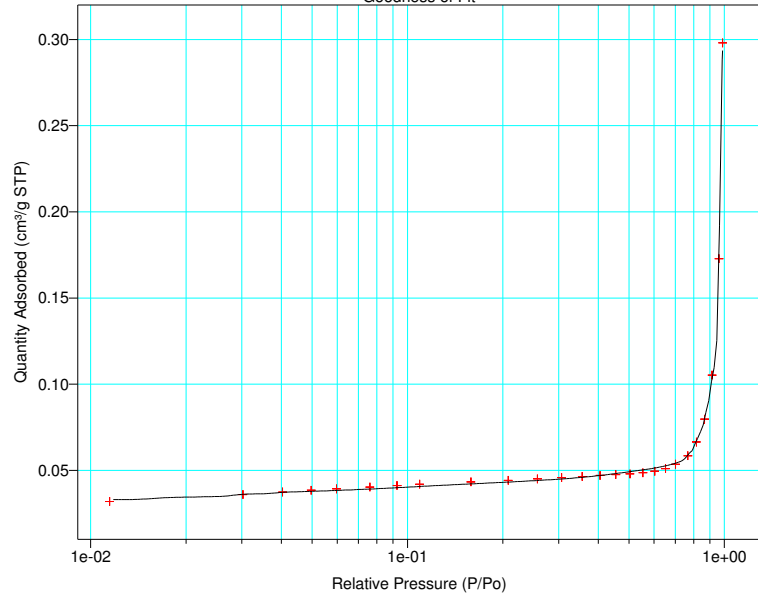
DFT Plus(R) V3.00 (ASAP 2020 V1.05) Unit 1 Page13

Sample: STONE6
Operator:
Submitter:
Source File: D:\DATA\2020\EVA\STONE6.SMP

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Porosity Distribution by Original Density Functional Theory
Model: N2 @ 77K on Carbon, Slit Pores
Method: Non-negative Regularization; No Smoothing

Standard Deviation of Fit: 0.00165, cm³/g
Goodness of Fit



Micromeritics Instrument Corporation

DFT Plus(R) V3.00 (ASAP 2020 V1.05) Unit 1 Page14

Sample: STONE6
Operator:
Submitter:
Source File: D:\DATA\2020\EVA\STONE6.SMP

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