# SURFACE AREA ANALYSES

Micromeritics

**Summary of Surface Area and T-plot Analyses**
**by**
**Micromeritics**

| Sample | Standard Surface Area ($m^2/g$) | BET Surface Area ($m^2/g$) | Single Pt Surface Area ($m^2/g$) | External Surface Area | Micropore Area ($m^2/g$) | Micropore Volume (cc/g) |
|---|---|---|---|---|---|---|
| ASH*200/230*UC*WA | | .1209 | .1168 | .1021 | .0188 | .000022 |
| CDV*100/200*UC*WA*HL*CPT*Naf | | 1.7286 | 1.6236 | 2.2981 | -.5695 | -.000176 |
| 8006 (alpha alumina) | 0.229 | .2192 | .2043 | .1989 | .0203 | .000026 |
| ASH*230/325*UC*WA | | .1168 | .1137 | .0770 | .0397 | .000033 |
| CDV*100/200*UC*WA*HL*CPT*Naf | | 7.5042 | 7.0310 | 10.4914 | -2.9873 | -.001009 |
| ASH*325/450*UC*WA | | .1852 | .1763 | .1579 | .0273 | .000027 |
| ASH*230/325*UC*WA | | .1495 | .1373 | .1120 | .0375 | .000032 |
| 8005 (alpha alumina) | 2.09 | 1.5268 | 1.4120 | 1.6742 | -.1474 | .000011 |
| CDV*100/200*UC*WA*HL*CPT*Naf | | 8.3937 | 7.8142 | 11.5258 | -3.1321 | -.001080 |

**Surface Area Analysis Terms:**

**BET** = total surface area = external surface + micropores
Brunauer-Emmett-Teller

**T-plot** = single pt surface area = external surface

**Micropore Area** = BET (total surface area) - t-plot (external surface)

**Micropore Volume** = extrapolate t-plot back to zero to get volume of gas in micropores. Negative values caused by noise in system - should interpret negative values as zero.

BET = Total surface area = external surface + micropores

T-plot = external surface

Micropore Area = BET (total surface area) - T-plot (external)

Micropore Volume: extrapolate T-plot back to zero to get volume of gas in micropores
Negative values caused by NOISE in system - should interpret negative values as zero.

## SUMMARY OF RESULTS OF SURFACE AREA AND T-PLOT ANALYSIS PERFORMED BY MICROMETRICS

| SAMPLE | BET SURFACE AREA ($m^2/g$) | SINGLE PT SURFACE AREA ($m^2/g$) | MICROPORE AREA ($m^2/g$) | MICROPORE VOLUME (cc/g) |
|---|---|---|---|---|
| (A) ASH*200/230*UC*WA | .1209 | .1168 | .0188 | .000022 |
| (B) CDV*100/200*UC*WA *HL*CPT*Naf | 1.7286 | 1.6236 | -.5695 | -.000176 |
| (C) 8006 (NIST std. 0.229 $m^2/g$) | .2192 | .2043 | .0203 | .000026 |
| (D) ASH*230/325*UC*WA | .1168 | .1137 | .0397 | .000033 |
| (E) CDV*100/200*UC*WA *HL*CPT*Naf | 7.5042 | 7.0310 | -2.9873 | -.001009 |
| (F) ASH*325/450*UC*WA | .1852 | .1763 | .0273 | .000027 |
| (G) ASH*230/325*UC*WA | .1495 | .1373 | .0375 | .000032 |
| (H) 8005 (NIST std. 2.09 $m^2/g$) | 1.5268 | 1.4120 | -.1474 | .000011 |
| (I) CDV*100/200*UC*WA *HL*CPT*Naf | 8.3937 | 7.8142 | -3.1321 | -.001080 |

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SAMPLE DIRECTORY/NUMBER: DATA3 /210
SAMPLE ID: SAMPLE A MAL 1750 B6
SUBMITTER: SOUTHWEST RESEARCH
OPERATOR: TK
UNIT NUMBER: 1
ANALYSIS GAS: Argon

START 09:08:40 08/27/91
COMPL 10:31:18 08/27/91
REPRT 13:49:38 08/28/91
SAMPLE WT: 5.5030 g
FREE SPACE: 48.1580 cc
EQUIL INTRVL: 15 sec

ANALYSIS LOG

| RELATIVE PRESSURE | PRESSURE (mmHg) | VOL ADSORBED (cc/g STP) | ELAPSED TIME (HR:MN) | SATURATION PRESS. (mmHg) |
|---|---|---|---|---|
| | | | 0:33 | 192.420 |
| 0.0099 | 1.913 | 0.0160 | 0:39 | |
| 0.0306 | 5.896 | 0.0225 | 0:42 | |
| 0.0546 | 10.498 | 0.0262 | 0:46 | |
| 0.0774 | 14.894 | 0.0296 | 0:49 | |
| 0.0951 | 18.307 | 0.0309 | 0:52 | |
| 0.1126 | 21.669 | 0.0328 | 0:56 | |
| 0.1355 | 26.064 | 0.0355 | 0:59 | |
| 0.1701 | 32.736 | 0.0372 | 1:02 | |
| 0.2099 | 40.389 | 0.0398 | 1:06 | |
| 0.2610 | 50.215 | 0.0427 | 1:09 | |
| 0.3131 | 60.248 | 0.0458 | 1:12 | |
| 0.3980 | 76.590 | 0.0513 | 1:16 | |
| 0.4566 | 87.864 | 0.0544 | 1:19 | |
| 0.5706 | 109.791 | 0.0607 | 1:22 | |

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SAMPLE DIRECTORY/NUMBER: DATA3 /210
SAMPLE ID: SAMPLE A MAL 1750 B6
SUBMITTER: SOUTHWEST RESEARCH
OPERATOR: TK
UNIT NUMBER: 1
ANALYSIS GAS: Argon

START 09:08:40 08/27/91
COMPL 10:31:18 08/27/91
REPRT 13:49:38 08/28/91
SAMPLE WT: 5.5030 g
FREE SPACE: 48.1580 cc
EQUIL INTRVL: 15 sec

BET SURFACE AREA REPORT

| | | | | |
|---|---|---|---|---|
| BET SURFACE AREA: | 0.1209 | +/- | 0.0005 | sq. m/g |
| SLOPE: | 30.189703 | +/- | 0.120778 | |
| Y-INTERCEPT: | 0.490879 | +/- | 0.019226 | |
| C: | 62.501354 | | | |
| VM: | 0.032594 | cc/g STP | | |
| CORRELATION COEFFICIENT: | 9.99976E-01 | | | |

| RELATIVE PRESSURE | VOL ADSORBED (cc/g STP) | 1/ [VA(Po/P - 1)] |
|---|---|---|
| 0.0306 | 0.0225 | 1.403144 |
| 0.0774 | 0.0296 | 2.832959 |
| 0.0951 | 0.0309 | 3.398018 |
| 0.1126 | 0.0328 | 3.864366 |
| 0.3131 | 0.0458 | 9.942251 |

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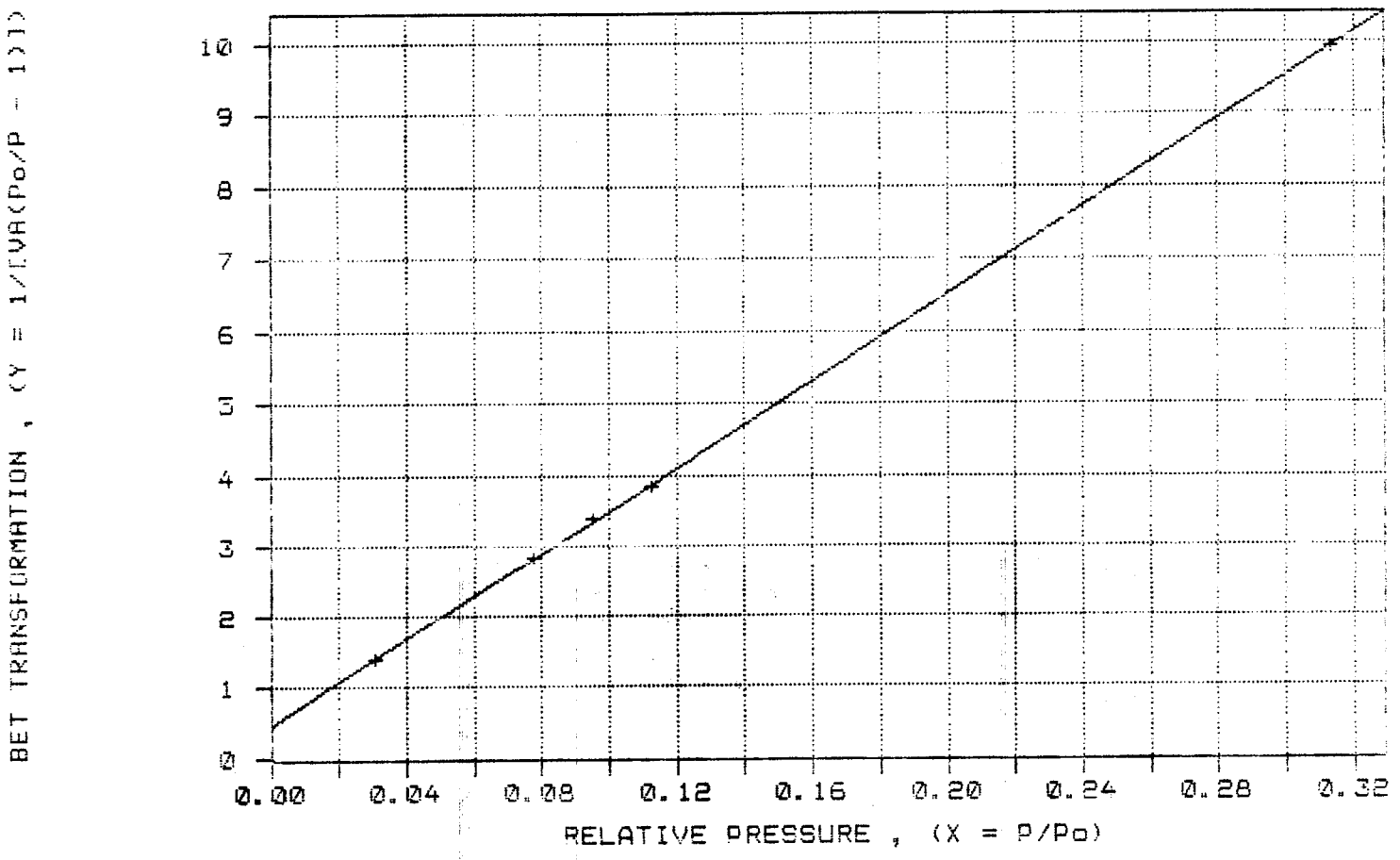
SAMPLE DIRECTORY/NUMBER: DATA3 /210
SAMPLE ID: SAMPLE A MAL 1750 B6
SUBMITTER: SOUTHWEST RESEARCH
OPERATOR: TK
UNIT NUMBER: 1
ANALYSIS GAS: Argon

START 09:08:40 08/27/91
COMPL 10:31:18 08/27/91
REPRT 13:49:38 08/28/91
SAMPLE WT: 5.5030 g
FREE SPACE: 48.1580 cc
EQUIL INTRVL: 15 sec

BET PLOT



SAMPLE DIRECTORY/NUMBER: DATA3 /210
SAMPLE ID: SAMPLE A MAL 1750 B6
SUBMITTER: SOUTHWEST RESEARCH
OPERATOR: TK
UNIT NUMBER: 1
ANALYSIS GAS: Argon

START 09:08:40 08/27/91
COMPL 10:31:18 08/27/91
REPRT 13:49:38 08/28/91
SAMPLE WT: 5.5030 g
FREE SPACE: 48.1580 cc
EQUIL INTRVL: 15 sec

## MICROPORE ANALYSIS REPORT

MICROPORE VOLUME: 0.000022 cc/g
MICROPORE AREA: 0.0188 sq. m/g
EXTERNAL SURFACE AREA: 0.1021 sq. m/g
SLOPE: 0.006599 +/- 0.000181
Y-INTERCEPT: 0.013941 +/- 0.001146
CORRELATION COEFFICIENT: 9.99623E-01

| RELATIVE PRESSURE | STATISTICAL THICKNESS, (A ) | VOL ADSORBED (cc/g STP) |
|---|---|---|
| 0.0546 | 3.284 | 0.0262 |
| 0.0774 | 3.495 | 0.0296 |
| 0.0951 | 3.640 | 0.0309 |
| 0.1126 | 3.774 | 0.0328 |
| 0.1355 | 3.938 | 0.0355 |
| 0.1701 | 4.173 | 0.0372 |
| 0.2099 | 4.433 | 0.0398 |
| 0.2610 | 4.760 | 0.0427 |
| 0.3131 | 5.098 | 0.0458 |
| 0.3980 | 5.677 | 0.0513 |
| 0.4566 | 6.112 | 0.0544 |
| 0.5706 | 7.098 | 0.0607 |

THICKNESS VALUES USED IN THE LEAST-SQUARES ANALYSIS
WERE BETWEEN 5.500 AND 8.000 A .

$$t = [\ 13.9900/(\ 0.0340 - \log(P/Po))]^{0.500}$$

SURFACE AREA CORRECTION FACTOR IS 1.000.

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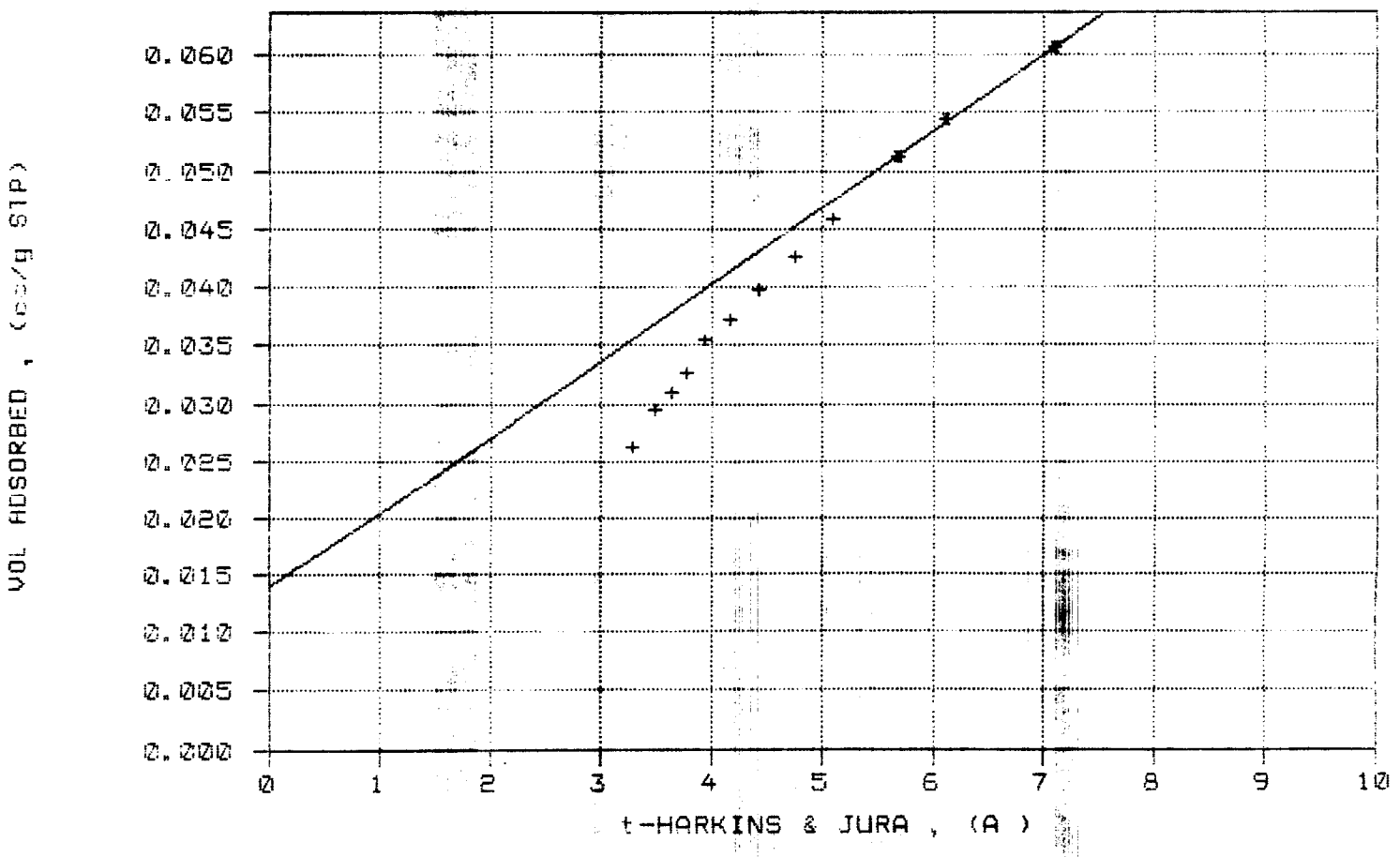
ASAP 2000 V2.00 PAGE 5

SAMPLE DIRECTORY/NUMBER: DATA3 /210
SAMPLE ID: SAMPLE A MAL 1750 B6
SUBMITTER: SOUTHWEST RESEARCH
OPERATOR: TK
UNIT NUMBER: 1
ANALYSIS GAS: Argon

START 09:08:40 08/27/91
COMPL 10:31:18 08/27/91
REPRT 13:49:38 08/28/91
SAMPLE WT: 5.5030 g
FREE SPACE: 48.1580 cc
EQUIL INTRVL: 15 sec

T-PLOT
* fitted, + non-fitted



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ASAP 2000 V2.00 PAGE 6

SAMPLE DIRECTORY/NUMBER: DATA3 /210
SAMPLE ID: SAMPLE A MAL 1750 B6
SUBMITTER: SOUTHWEST RESEARCH
OPERATOR: TK
UNIT NUMBER: 1
ANALYSIS GAS: Argon

START 09:08:40 08/27/91
COMPL 10:31:18 08/27/91
REPRT 13:49:38 08/28/91
SAMPLE WT: 5.5030 g
FREE SPACE: 48.1580 cc
EQUIL INTRVL: 15 sec

## SUMMARY REPORT

### AREA

| | | |
|---|---|---|
| BET SURFACE AREA: | 0.1209 | sq. m/g |
| SINGLE POINT SURFACE AREA AT P/Po 0.3131: | 0.1168 | sq. m/g |
| MICROPORE AREA: | 0.0188 | sq. m/g |

### VOLUME

| | | |
|---|---|---|
| MICROPORE VOLUME: | 0.000022 | cc/g |

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ASAP 2000 V2.00 PAGE 1

SAMPLE DIRECTORY/NUMBER: DATA3 /211
SAMPLE ID: SAMPLE B MAL 1751 B8
SUBMITTER: SOUTHWEST RESEARCH
OPERATOR: TK
UNIT NUMBER: 1
ANALYSIS GAS: Argon

START 11:08:26 08/27/91
COMPL 13:01:41 08/27/91
REPRT 13:27:29 08/27/91
SAMPLE WT: 6.2413 g
FREE SPACE: 47.8381 cc
EQUIL INTRVL: 15 sec

ANALYSIS LOG

| RELATIVE PRESSURE | PRESSURE (mmHg) | VOL ADSORBED (cc/g STP) | ELAPSED TIME (HR:MN) | SATURATION PRESS. (mmHg) |
|---|---|---|---|---|
| | | | 0:36 | 192.163 |
| 0.0097 | 1.862 | 0.2030 | 0:54 | |
| 0.0296 | 5.689 | 0.3067 | 1:02 | |
| 0.0514 | 9.878 | 0.3580 | 1:06 | |
| 0.0700 | 13.446 | 0.3893 | 1:10 | |
| 0.0885 | 17.014 | 0.4149 | 1:13 | |
| 0.1063 | 20.427 | 0.4367 | 1:16 | |
| 0.1286 | 24.720 | 0.4618 | 1:20 | |
| 0.1475 | 28.340 | 0.4819 | 1:23 | |
| 0.1652 | 31.753 | 0.5006 | 1:26 | |
| 0.1876 | 36.045 | 0.5222 | 1:30 | |
| 0.2188 | 42.044 | 0.5529 | 1:33 | |
| 0.2530 | 48.612 | 0.5861 | 1:36 | |
| 0.3009 | 57.817 | 0.6318 | 1:40 | |
| 0.3789 | 72.815 | 0.7091 | 1:43 | |
| 0.4392 | 84.399 | 0.7739 | 1:46 | |
| 0.4965 | 95.414 | 0.8416 | 1:50 | |
| 0.5517 | 106.016 | 0.9144 | 1:53 | |

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SAMPLE DIRECTORY/NUMBER: DATA3 /211
SAMPLE ID: SAMPLE B MAL 1751 B8
SUBMITTER: SOUTHWEST RESEARCH
OPERATOR: TK
UNIT NUMBER: 1
ANALYSIS GAS: Argon

START 11:08:26 08/27/91
COMPL 13:01:41 08/27/91
REPRT 13:27:29 08/27/91
SAMPLE WT: 6.2413 g
FREE SPACE: 47.8381 cc
EQUIL INTRVL: 15 sec

## BET SURFACE AREA REPORT

| | | | | |
|---|---|---|---|---|
| BET SURFACE AREA: | 1.7286 | +/- | 0.0092 | sq. m/g |
| SLOPE: | 2.096877 | +/- | 0.011256 | |
| Y-INTERCEPT: | 0.048375 | +/- | 0.001864 | |
| C: | 44.346252 | | | |
| VM: | 0.466146 | cc/g STP | | |
| CORRELATION COEFFICIENT: | 9.99957E-01 | | | |

| RELATIVE PRESSURE | VOL ADSORBED (cc/g STP) | 1/ [VA(Po/P - 1)] |
|---|---|---|
| 0.0700 | 0.3893 | 0.193270 |
| 0.1063 | 0.4367 | 0.272406 |
| 0.1475 | 0.4819 | 0.358968 |
| 0.1876 | 0.5222 | 0.442109 |
| 0.2530 | 0.5861 | 0.577773 |

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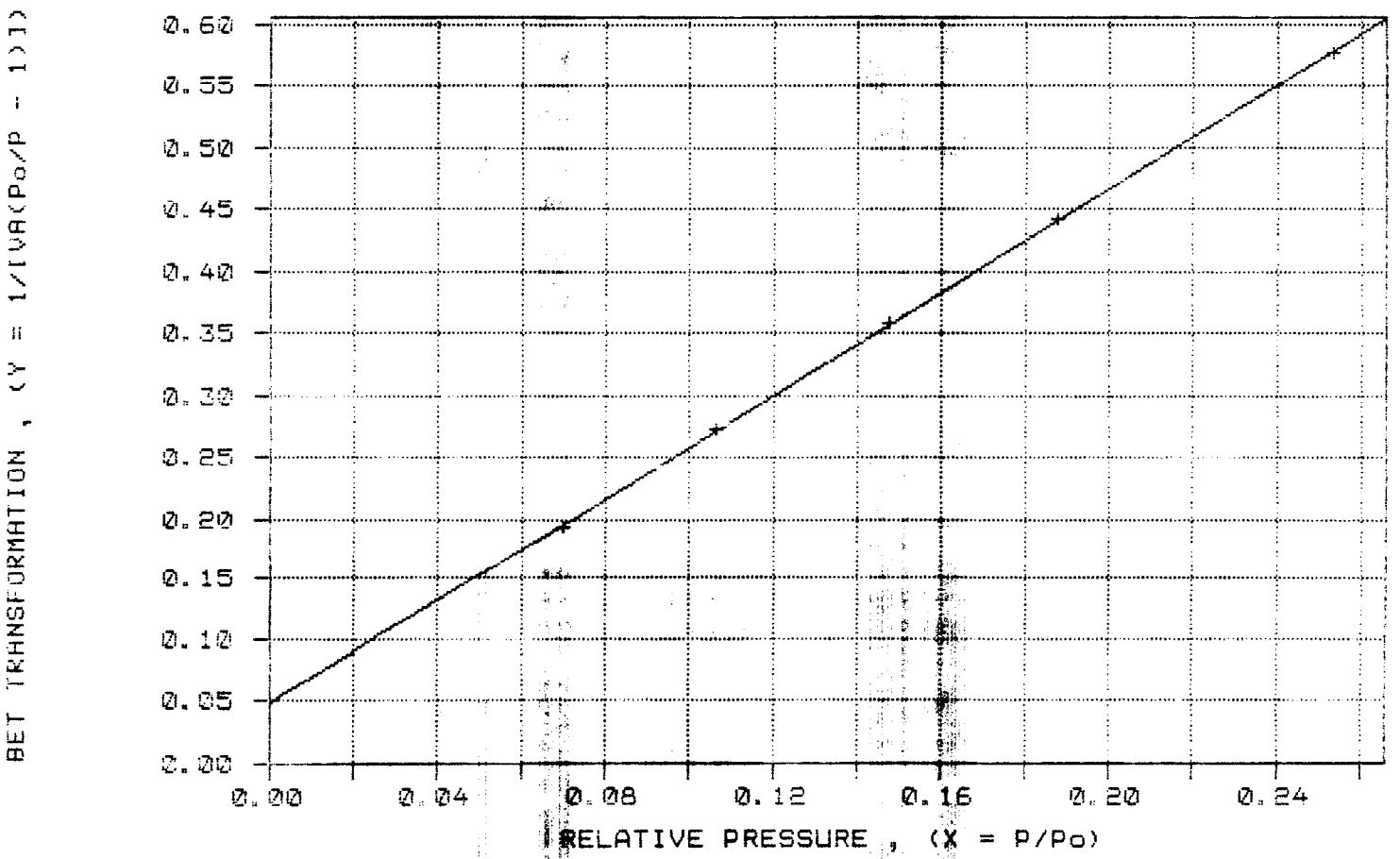
ASAP 2000 V2.00 PAGE 3

SAMPLE DIRECTORY/NUMBER: DATA3 /211
SAMPLE ID: SAMPLE B MAL 1751 B8
SUBMITTER: SOUTHWEST RESEARCH
OPERATOR: TK
UNIT NUMBER: 1
ANALYSIS GAS: Argon

START 11:08:26 08/27/91
COMPL 13:01:41 08/27/91
REPRT 13:27:29 08/27/91
SAMPLE WT: 6.2413 g
FREE SPACE: 47.8381 cc
EQUIL INTRVL: 15 sec

BET PLOT



SAMPLE DIRECTORY/NUMBER: DATA3 /211
SAMPLE ID: SAMPLE B MAL 1751 B8
SUBMITTER: SOUTHWEST RESEARCH
OPERATOR: TK
UNIT NUMBER: 1
ANALYSIS GAS: Argon

START 11:08:26 08/27/91
COMPL 13:01:41 08/27/91
REPRT 13:27:29 08/27/91
SAMPLE WT: 6.2413 g
FREE SPACE: 47.8381 cc
EQUIL INTRVL: 15 sec

## MICROPORE ANALYSIS REPORT

MICROPORE VOLUME: -0.000176 cc/g
MICROPORE AREA: -0.5695 sq. m/g
EXTERNAL SURFACE AREA: 2.2981 sq. m/g
SLOPE: 0.148574 +/- 0.000143
Y-INTERCEPT: -0.114002 +/- 0.000806
CORRELATION COEFFICIENT: 9.99995E-01

| RELATIVE PRESSURE | STATISTICAL THICKNESS,(A ) | VOL ADSORBED (cc/g STP) |
|---|---|---|
| 0.0514 | 3.252 | 0.3580 |
| 0.0700 | 3.430 | 0.3893 |
| 0.0885 | 3.588 | 0.4149 |
| 0.1063 | 3.726 | 0.4367 |
| 0.1286 | 3.890 | 0.4618 |
| 0.1475 | 4.021 | 0.4819 |
| 0.1652 | 4.141 | 0.5006 |
| 0.1876 | 4.288 | 0.5222 |
| 0.2188 | 4.490 | 0.5529 |
| 0.2530 | 4.709 | 0.5861 |
| 0.3009 | 5.018 | 0.6318 |
| 0.3789 | 5.542 | 0.7091 |
| 0.4392 | 5.979 | 0.7739 |
| 0.4965 | 6.433 | 0.8416 |
| 0.5517 | 6.918 | 0.9144 |

THICKNESS VALUES USED IN THE LEAST-SQUARES ANALYSIS WERE BETWEEN 4.300 AND 8.000 A .

$$t = [\ 13.9900/(\ 0.0340 - \log(P/Po))]^{0.500}$$

SURFACE AREA CORRECTION FACTOR IS 1.000.

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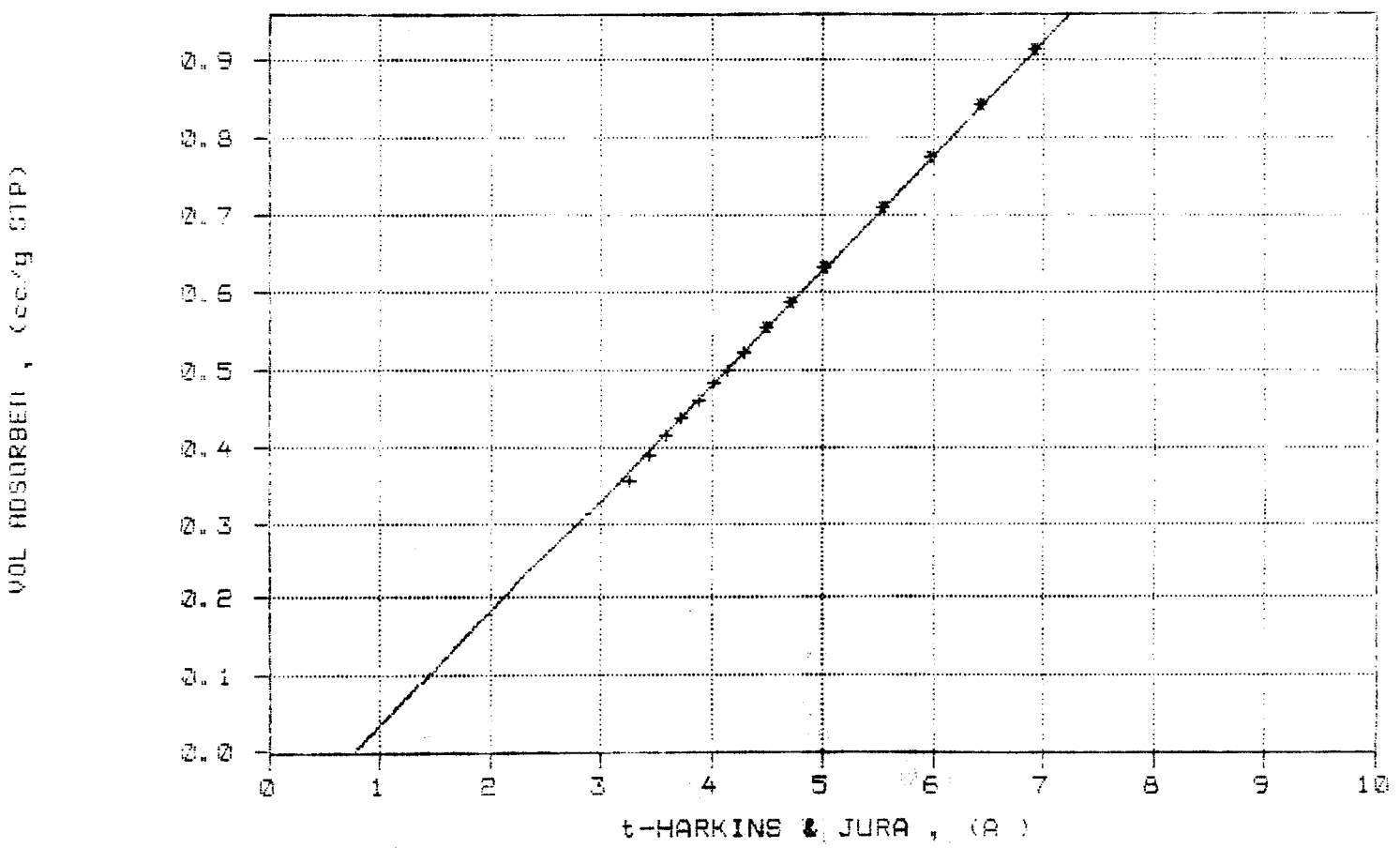
ASAP 2000 V2.00 PAGE 5

SAMPLE DIRECTORY/NUMBER: DATA3 /211
SAMPLE ID: SAMPLE B MAL 1751 BB
SUBMITTER: SOUTHWEST RESEARCH
OPERATOR: TK
UNIT NUMBER: 0
ANALYSIS GAS: Argon

START 11:08:26 08/27/91
COMPL 13:01:41 08/27/91
REPRT 13:27:29 08/27/91
SAMPLE WT: 6.2413 g
FREE SPACE: 47.8361 cc
EQUIL INTRVL: 15 sec

T-PLOT
* fitted, + non-fitted



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ASAP 2000 V2.00 PAGE 6

SAMPLE DIRECTORY/NUMBER: DATA3 /211
SAMPLE ID: SAMPLE B MAL 1751 88
SUBMITTER: SOUTHWEST RESEARCH
OPERATOR: TK
UNIT NUMBER: 1
ANALYSIS GAS: Argon

START 11:08:26 08/27/91
COMPL 13:01:41 08/27/91
REPRT 13:27:29 08/27/91
SAMPLE WT: 6.2413 g
FREE SPACE: 47.8381 cc
EQUIL INTRVL: 15 sec

## SUMMARY REPORT

### AREA

| | | |
|---|---|---|
| BET SURFACE AREA: | 1.7286 | sq. m/g |
| SINGLE POINT SURFACE AREA AT P/Po 0.2530: | 1.6236 | sq. m/g |
| MICROPORE AREA: | -0.5695 | sq. m/g |

### VOLUME

| | | |
|---|---|---|
| MICROPORE VOLUME: | -0.000176 | cc/g |

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ASAP 2000 V1.00 PAGE 1

SAMPLE DIRECTORY/NUMBER: DATA3 /212
SAMPLE ID: SAMPLE C MAL 1752 B9
SUBMITTER: SOUTHWEST RESEARCH
OPERATOR: TK
UNIT NUMBER: 1
ANALYSIS GAS: Argon

START 13:24:23 08/27/91
COMPL 14:55:45 08/27/91
REPRT 13:52:31 08/28/91
SAMPLE WT: 5.0967 g
FREE SPACE: 47.8448 cc
EQUIL INTRVL: 15 sec

ANALYSIS LOG

| RELATIVE PRESSURE | PRESSURE (mmHg) | VOL ADSORBED (cc/g STP) | ELAPSED TIME (HR:MN) | SATURATION PRESS. (mmHg) |
|---|---|---|---|---|
| | | | 0:38 | 191.795 |
| 0.0102 | 1.965 | 0.0254 | 0:44 | |
| 0.0294 | 5.637 | 0.0364 | 0:48 | |
| 0.0539 | 10.343 | 0.0437 | 0:51 | |
| 0.0771 | 14.790 | 0.0491 | 0:54 | |
| 0.0949 | 18.204 | 0.0519 | 0:58 | |
| 0.1119 | 21.462 | 0.0547 | 1:01 | |
| 0.1345 | 25.806 | 0.0585 | 1:04 | |
| 0.1523 | 29.219 | 0.0612 | 1:08 | |
| 0.1920 | 36.821 | 0.0663 | 1:11 | |
| 0.2270 | 43.544 | 0.0700 | 1:14 | |
| 0.2613 | 50.112 | 0.0746 | 1:18 | |
| 0.3125 | 59.938 | 0.0797 | 1:21 | |
| 0.3974 | 76.228 | 0.0890 | 1:24 | |
| 0.4560 | 87.450 | 0.0961 | 1:28 | |
| 0.5692 | 109.170 | 0.1075 | 1:31 | |

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SAMPLE DIRECTORY/NUMBER: DATA3 /212
SAMPLE ID: SAMPLE C MAL 1752 B9
SUBMITTER: SOUTHWEST RESEARCH
OPERATOR: TK
UNIT NUMBER: 1
ANALYSIS GAS: Argon

START 13:24:23 08/27/91
COMPL 14:55:45 08/27/91
REPRT 13:52:31 08/28/91
SAMPLE WT: 5.0967 g
FREE SPACE: 47.8448 cc
EQUIL INTRVL: 15 sec

## BET SURFACE AREA REPORT

| | | | | |
|---|---|---|---|---|
| BET SURFACE AREA: | 0.2192 | +/- | 0.0015 | sq. m/g |
| SLOPE: | 16.482681 | +/- | 0.111752 | |
| Y-INTERCEPT: | 0.433769 | +/- | 0.018372 | |
| C: | 38.998756 | | | |
| VM: | 0.059114 cc/g STP | | | |
| CORRELATION COEFFICIENT: | 9.99931E-01 | | | |

| RELATIVE PRESSURE | VOL ADSORBED (cc/g STP) | 1/ [VA(Po/P - 1)] |
|---|---|---|
| 0.0539 | 0.0437 | 1.305505 |
| 0.0949 | 0.0519 | 2.020048 |
| 0.1345 | 0.0585 | 2.658071 |
| 0.1920 | 0.0663 | 3.584835 |
| 0.2613 | 0.0746 | 4.742296 |

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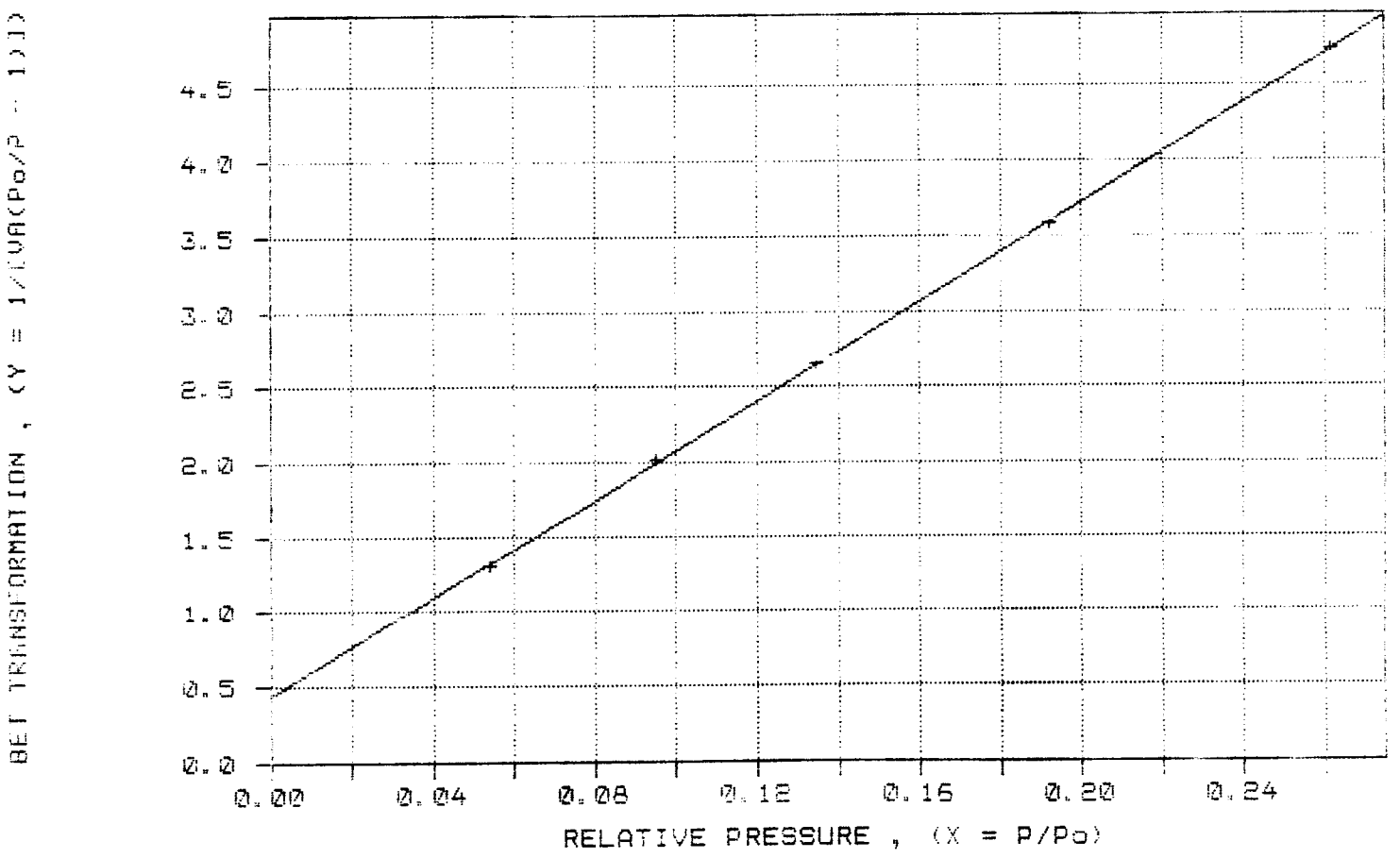
SAMPLE DIRECTORY/NUMBER: DATA3 /212
SAMPLE ID: SAMPLE C MAL 1752 B9
SUBMITTER: SOUTHWEST RESEARCH
OPERATOR: TK
UNIT NUMBER: 1
ANALYSIS GAS: Argon

START 13:24:23 08/27/91
COMPL 14:55:45 08/27/91
REPRT 13:52:31 08/28/91
SAMPLE WT: 5.0967 g
FREE SPACE: 47.8448 cc
EQUIL INTRVL: 15 sec

BET PLOT



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ASAP 2000 V2.00 PAGE 4

SAMPLE DIRECTORY/NUMBER: DATA3 /212
SAMPLE ID: SAMPLE C MAL 1752 89
SUBMITTER: SOUTHWEST RESEARCH
OPERATOR: TK
UNIT NUMBER: 1
ANALYSIS GAS: Argon

START 13:24:23 08/27/91
COMPL 14:55:45 08/27/91
REPRT 13:52:31 08/28/91
SAMPLE WT: 5.0967 g
FREE SPACE: 47.8440 cc
EQUIL INTRVL: 15 sec

MICROPORE ANALYSIS REPORT

| | | | |
|---|---|---|---|
| MICROPORE VOLUME: | 0.000026 | cc/g | |
| MICROPORE AREA: | 0.0203 | sq. m/g | |
| EXTERNAL SURFACE AREA: | 0.1989 | sq. m/g | |
| SLOPE: | 0.012861 | +/- | 0.001046 |
| Y-INTERCEPT: | 0.016651 | +/- | 0.006607 |
| CORRELATION COEFFICIENT: | 9.96709E-01 | | |

| RELATIVE PRESSURE | STATISTICAL THICKNESS, (A ) | VOL ADSORBED (cc/g STP) |
|---|---|---|
| 0.0539 | 3.278 | 0.0437 |
| 0.0771 | 3.493 | 0.0491 |
| 0.0949 | 3.639 | 0.0519 |
| 0.1119 | 3.768 | 0.0547 |
| 0.1345 | 3.931 | 0.0585 |
| 0.1523 | 4.054 | 0.0612 |
| 0.1920 | 4.317 | 0.0663 |
| 0.2270 | 4.543 | 0.0700 |
| 0.2613 | 4.762 | 0.0746 |
| 0.3125 | 5.094 | 0.0797 |
| 0.3974 | 5.673 | 0.0890 |
| 0.4560 | 6.107 | 0.0961 |
| 0.5692 | 7.085 | 0.1075 |

THICKNESS VALUES USED IN THE LEAST-SQUARES ANALYSIS
WERE BETWEEN 5.500 AND 8.000 A .

$$t = [\ 13.9900/(\ 0.0340 - \log(P/Po))]^{0.500}$$

SURFACE AREA CORRECTION FACTOR IS 1.000.

Micromeritics Instrument Corporation

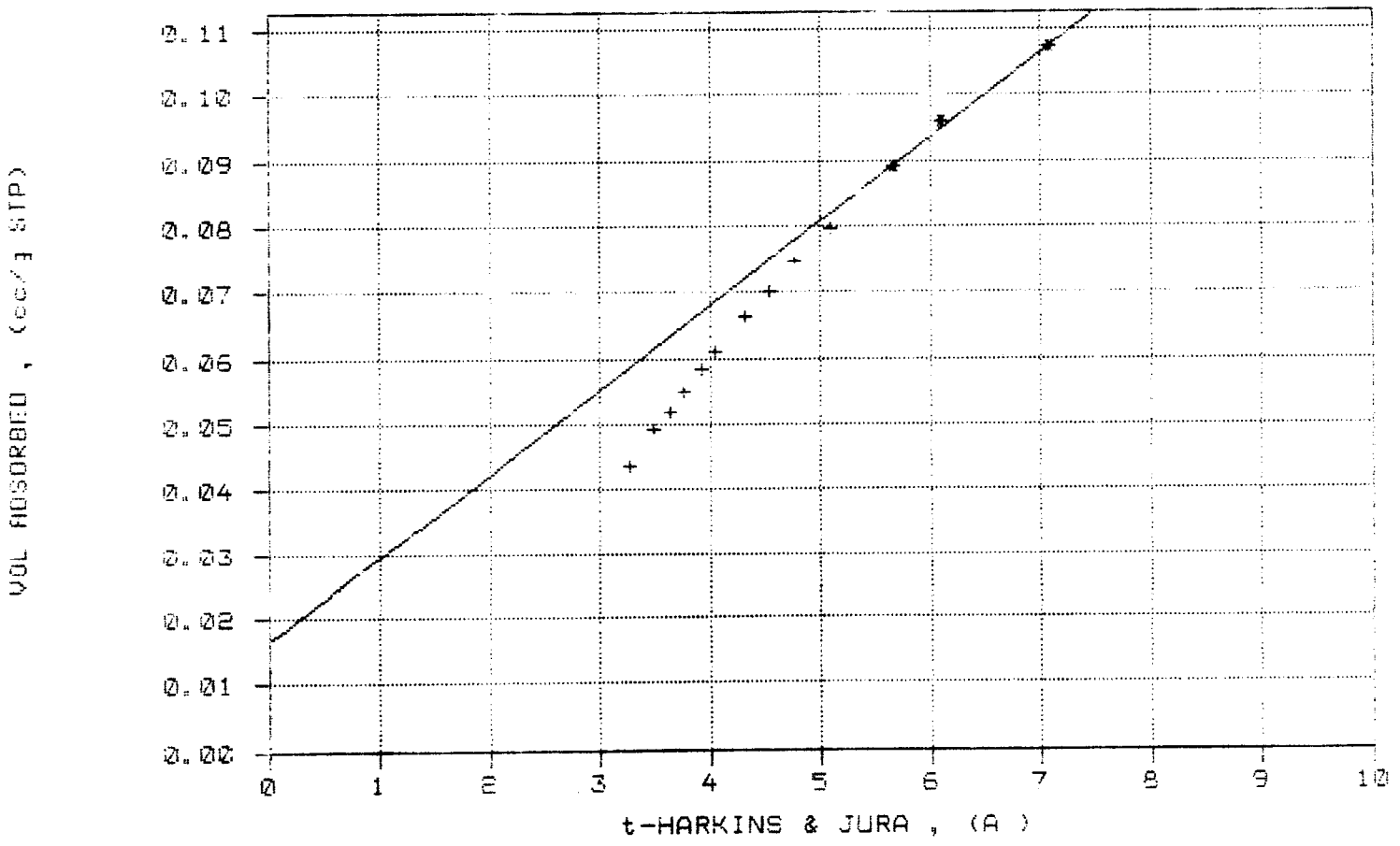
ASAP 2000 V2.00



SAMPLE DIRECTORY/NUMBER: DATA3 /212
SAMPLE ID: SAMPLE C MAL 1752 B9
SUBMITTER: SOUTHWEST RESEARCH
OPERATOR: TK
UNIT NUMBER: 1
ANALYSIS GAS: Argon

START 13:24:23 08/27/91
COMPL 14:55:45 08/27/91
REPRT 13:52:31 06/28/91
SAMPLE WT: 5.0967 g
FREE SPACE: 47.8448 cc
EQUIL INTRVL: 15 sec

T-PLOT
* fitted, + non-fitted



Micromeritics Instrument Corporation

ASAP 2000 V2.00 PAGE 6

SAMPLE DIRECTORY/NUMBER: DATA3 /212
SAMPLE ID: SAMPLE C MAL 1752 B9
SUBMITTER: SOUTHWEST RESEARCH
OPERATOR: TK
UNIT NUMBER: 1
ANALYSIS GAS: Argon

START 13:24:23 08/27/91
COMPL 14:55:45 08/27/91
REPRT 13:52:31 08/28/91
SAMPLE WT: 5.0967 g
FREE SPACE: 47.8448 cc
EQUIL INTRVL: 15 sec

## SUMMARY REPORT

### AREA

| | | |
|---|---|---|
| BET SURFACE AREA: | 0.2192 | sq. m/g |
| SINGLE POINT SURFACE AREA AT P/Po 0.2613: | 0.2043 | sq. m/g |
| MICROPORE AREA: | 0.0203 | sq. m/g |

### VOLUME

| | | |
|---|---|---|
| MICROPORE VOLUME: | 0.000026 | cc/g |

Micromeritics Instrument Corporation

ASAP 2000 V2.00 PAGE 1

SAMPLE DIRECTORY/NUMBER: DATA3 /213
SAMPLE ID: SAMPLE D MAL 1753 C6
SUBMITTER: SOUTHWEST RESEARCH
OPERATOR: TK
UNIT NUMBER: 1
ANALYSIS GAS: Argon

START 06:58:10 08/28/91
COMPL 08:21:59 08/28/91
REPRT 13:55:37 08/28/91
SAMPLE WT: 4.9530 g
FREE SPACE: 46.7513 cc
EQUIL INTRVL: 15 sec

ANALYSIS LOG

| RELATIVE PRESSURE | PRESSURE (mmHg) | VOL ADSORBED (cc/g STP) | ELAPSED TIME (HR:MN) | SATURATION PRESS. (mmHg) |
|---|---|---|---|---|
| | | | 0:30 | 193.818 |
| 0.0117 | 2.275 | 0.0176 | 0:37 | |
| 0.0310 | 5.999 | 0.0234 | 0:40 | |
| 0.0544 | 10.550 | 0.0283 | 0:44 | |
| 0.0782 | 15.152 | 0.0312 | 0:47 | |
| 0.0955 | 18.514 | 0.0327 | 0:50 | |
| 0.1129 | 21.875 | 0.0335 | 0:54 | |
| 0.1358 | 26.323 | 0.0350 | 0:57 | |
| 0.1697 | 32.891 | 0.0371 | 1:00 | |
| 0.1934 | 37.493 | 0.0378 | 1:04 | |
| 0.2271 | 44.009 | 0.0397 | 1:07 | |
| 0.2625 | 50.836 | 0.0411 | 1:10 | |
| 0.3133 | 60.713 | 0.0446 | 1:14 | |
| 0.3994 | 77.416 | 0.0491 | 1:17 | |
| 0.4568 | 88.536 | 0.0518 | 1:20 | |
| 0.5710 | 110.670 | 0.0563 | 1:24 | |

Micromeritics Instrument Corporation

ASAP 2000 V2.00 PAGE 2

SAMPLE DIRECTORY/NUMBER: DATA3 /213
SAMPLE ID: SAMPLE D MAL 1753 C6
SUBMITTER: SOUTHWEST RESEARCH
OPERATOR: TK
UNIT NUMBER: 1
ANALYSIS GAS: Argon

START 06:58:10 08/28/91
COMPL 08:21:59 08/25/91
REPRT 13:55:37 08/26/91
SAMPLE WT: 4.9530 g
FREE SPACE: 46.7513 cc
EQUIL INTRVL: 15 sec

## BET SURFACE AREA REPORT

| | | | | |
|---|---|---|---|---|
| BET SURFACE AREA: | 0.1168 | +/- | 0.0006 | sq. m/g |
| SLOPE: | 31.516623 | +/- | 0.151086 | |
| Y-INTERCEPT: | 0.243010 | +/- | 0.024011 | |
| C: | 130.692429 | | | |
| VM: | 0.031487 | cc/g STP | | |
| CORRELATION COEFFICIENT: | 9.99966E-01 | | | |

| RELATIVE PRESSURE | VOL ADSORBED (cc/g STP) | 1/ [VA(Po/P - 1)] |
|---|---|---|
| 0.0782 | 0.0312 | 2.720053 |
| 0.1129 | 0.0335 | 3.802177 |
| 0.1358 | 0.0350 | 4.496466 |
| 0.1934 | 0.0378 | 6.347964 |
| 0.2271 | 0.0397 | 7.402994 |

Micromeritics Instrument Corporation

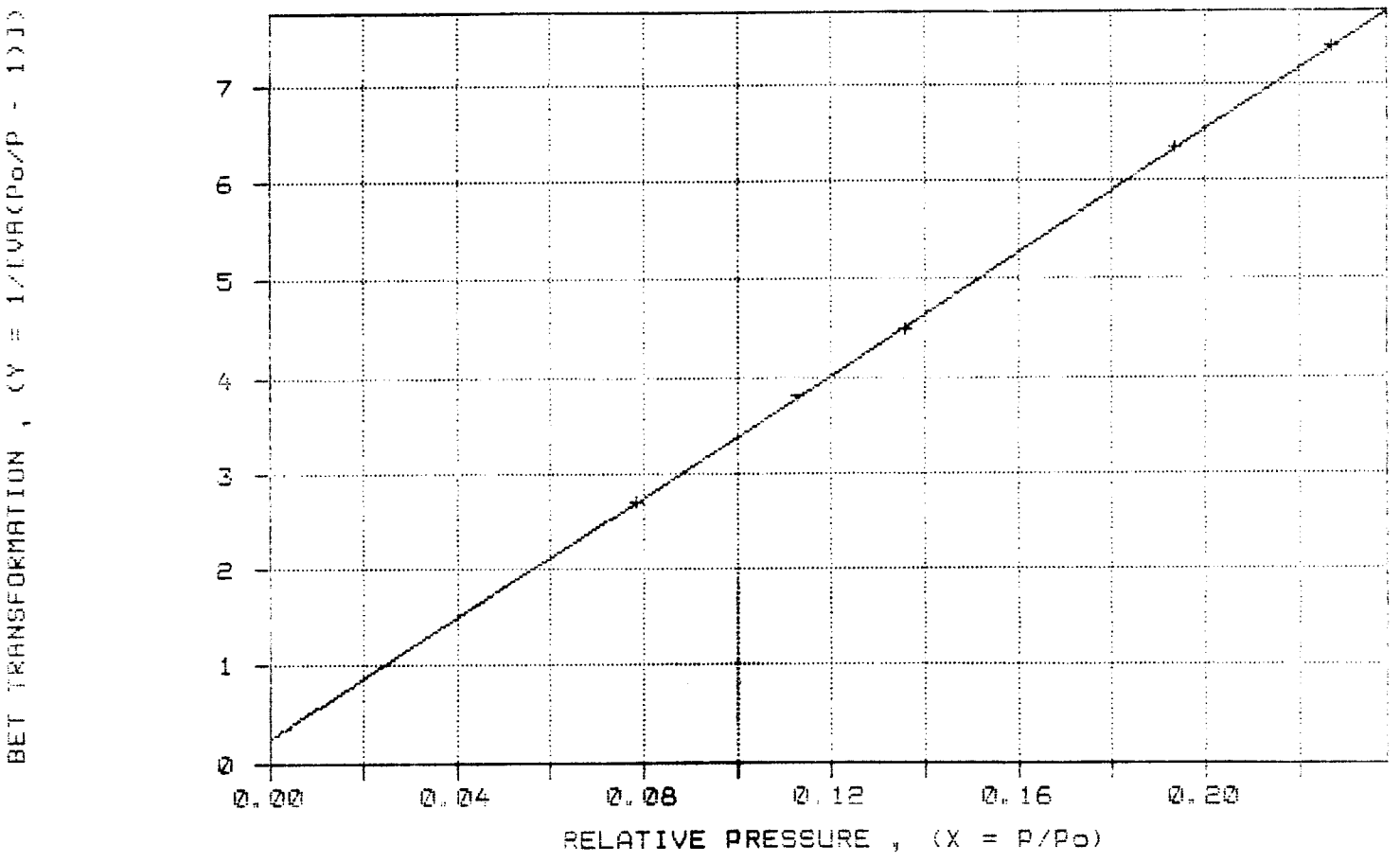
ASAP 2000 V2.00



SAMPLE DIRECTORY/NUMBER: DATA3 /213
SAMPLE ID: SAMPLE D MAL 1753 C6
SUBMITTER: SOUTHWEST RESEARCH
OPERATOR: TK
UNIT NUMBER: 1
ANALYSIS GAS: Argon

START 06:58:10 08/28/91
COMPL 08:21:59 08/28/91
REPRT 13:55:37 08/28/91
SAMPLE WT: 4.9530 g
FREE SPACE: 46.6513 cc
EQUIL INTRVL: 15 sec

BET PLOT



SAMPLE DIRECTORY/NUMBER: DATA3 /213
SAMPLE ID: SAMPLE D MAL 1753 C6
SUBMITTER: SOUTHWEST RESEARCH
OPERATOR: TK
UNIT NUMBER: 1
ANALYSIS GAS: Argon

START 06:58:10 08/28/91
COMPL 08:21:59 08/28/91
REPRT 13:55:37 08/29/91
SAMPLE WT: 4.9530 g
FREE SPACE: 46.7513 cc
EQUIL INTRVL: 15 sec

## MICROPORE ANALYSIS REPORT

| | | | |
|---|---|---|---|
| MICROPORE VOLUME: | 0.000033 | cc/g | |
| MICROPORE AREA: | 0.0397 | sq. m/g | |
| EXTERNAL SURFACE AREA: | 0.0770 | sq. m/g | |
| SLOPE: | 0.004979 | +/- | 0.000403 |
| Y-INTERCEPT: | 0.021037 | +/- | 0.002549 |
| CORRELATION COEFFICIENT: | 9.96744E-01 | | |

| RELATIVE PRESSURE | STATISTICAL THICKNESS, (A ) | VOL ADSORBED (cc/g STP) |
|---|---|---|
| 0.0544 | 3.283 | 0.0283 |
| 0.0782 | 3.502 | 0.0312 |
| 0.0955 | 3.643 | 0.0327 |
| 0.1129 | 3.776 | 0.0335 |
| 0.1358 | 3.940 | 0.0350 |
| 0.1697 | 4.171 | 0.0371 |
| 0.1934 | 4.326 | 0.0378 |
| 0.2271 | 4.543 | 0.0397 |
| 0.2623 | 4.769 | 0.0411 |
| 0.3133 | 5.099 | 0.0446 |
| 0.3994 | 5.687 | 0.0491 |
| 0.4568 | 6.114 | 0.0518 |
| 0.5710 | 7.102 | 0.0563 |

THICKNESS VALUES USED IN THE LEAST-SQUARES ANALYSIS
WERE BETWEEN 5.500 AND 8.000 A .

$$t = [\ 13.9900/(\ 0.0340 - \log(P/Po))\ ]^{0.500}$$

SURFACE AREA CORRECTION FACTOR IS 1.000.

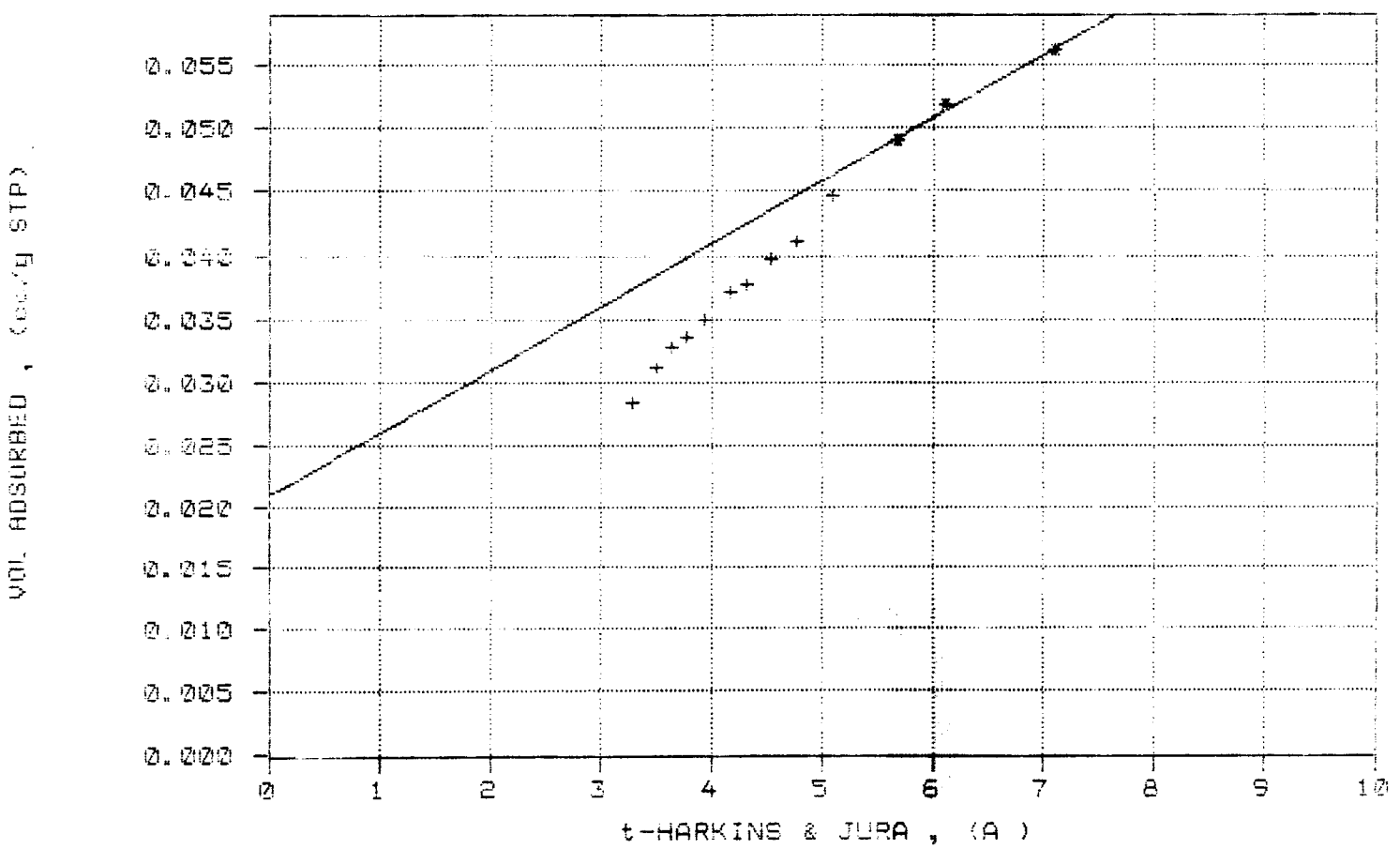
Micromeritics Instrument Corporation

ASAP 2000 V2.00 

SAMPLE DIRECTORY/NUMBER: DATA3 /213
SAMPLE ID: SAMPLE D MAL 1/53 C6
SUBMITTER: SOUTHWEST RESEARCH
OPERATOR: TK
UNIT NUMBER: 1
ANALYSIS GAS: Argon

START 06:58:10 08/28/91
COMPL 08:21:59 08/28/91
REPRT 13:55:37 08/28/91
SAMPLE WT: 4.9530 g
FREE SPACE: 46.7513 cc
EQUIL INTRVL: 15 sec

T-PLOT
* fitted, + non-fitted



SAMPLE DIRECTORY/NUMBER: DATA3 /213
SAMPLE ID: SAMPLE D MAL 1753 C6
SUBMITTER: SOUTHWEST RESEARCH
OPERATOR: TK
UNIT NUMBER: 1
ANALYSIS GAS: Argon

START 06:58:10 08/28/91
COMPL 08:21:59 08/28/91
REPRT 13:55:37 06/28/91
SAMPLE WT: 4.9530 g
FREE SPACE: 46.7513 cc
EQUIL INTRVL: 15 sec

## SUMMARY REPORT

### AREA

| | | |
|---|---|---|
| BET SURFACE AREA: | 0.1168 | sq. m/g |
| SINGLE POINT SURFACE AREA AT P/Po 0.2271: | 0.1137 | sq. m/g |
| MICROPORE AREA: | 0.0397 | sq. m/g |

### VOLUME

| | | |
|---|---|---|
| MICROPORE VOLUME: | 0.000033 | cc/g |

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ASAP 2000 V2.00



SAMPLE DIRECTORY/NUMBER: DATA3 /214
SAMPLE ID: SAMPLE E MAL 1754 R
SUBMITTER: SOUTHWEST RESEARCH
OPERATOR: TK
UNIT NUMBER: 1
ANALYSIS GAS: Argon

START 10:51:57 08/28/91
COMPL 12:43:19 08/28/91
REPRT 13:58:44 08/28/91
SAMPLE WT: 1.3035 g
FREE SPACE: 53.2344 cc
EQUIL INTRVL: 15 sec

ANALYSIS LOG

| RELATIVE PRESSURE | PRESSURE (mmHg) | VOL ADSORBED (cc/g STP) | ELAPSED TIME (HR:MN) | SATURATION PRESS. (mmHg) |
|---|---|---|---|---|
| | | | 0:37 | 193.413 |
| 0.0102 | 1.965 | 0.9444 | 0:54 | |
| 0.0297 | 5.740 | 1.3310 | 1:00 | |
| 0.0524 | 10.136 | 1.5490 | 1:04 | |
| 0.0711 | 13.756 | 1.6817 | 1:06 | |
| 0.0896 | 17.325 | 1.7923 | 1:11 | |
| 0.1075 | 20.789 | 1.8855 | 1:14 | |
| 0.1297 | 25.082 | 1.9947 | 1:18 | |
| 0.1484 | 28.702 | 2.0840 | 1:21 | |
| 0.1660 | 32.115 | 2.1625 | 1:24 | |
| 0.1877 | 36.304 | 2.2575 | 1:28 | |
| 0.2203 | 42.613 | 2.3975 | 1:31 | |
| 0.2543 | 49.181 | 2.5426 | 1:34 | |
| 0.3027 | 58.541 | 2.7492 | 1:38 | |
| 0.3816 | 73.797 | 3.1072 | 1:41 | |
| 0.4414 | 85.381 | 3.4066 | 1:44 | |
| 0.4981 | 96.345 | 3.7219 | 1:48 | |
| 0.5535 | 107.050 | 4.0689 | 1:51 | |

Micromeritics Instrument Corporation

ASAP 2000 V2.00 PAGE 2

SAMPLE DIRECTORY/NUMBER: DATA3 /214
SAMPLE ID: SAMPLE E MAL 1754 R
SUBMITTER: SOUTHWEST RESEARCH
OPERATOR: TK
UNIT NUMBER: 1
ANALYSIS GAS: Argon

START 10:51:57 08/28/91
COMPL 12:43:19 08/28/91
REPRT 13:58:44 08/28/91
SAMPLE WT: 1.3035 g
FREE SPACE: 53.2344 cc
EQUIL INTRVL: 10 sec

## BET SURFACE AREA REPORT

| | | | | |
|---|---|---|---|---|
| BET SURFACE AREA: | 7.5042 | +/- | 0.0449 | sq. m/g |
| SLOPE: | 0.482469 | +/- | 0.002916 | |
| Y-INTERCEPT: | 0.011694 | +/- | 0.000465 | |
| C: | 42.256039 | | | |
| VM: | 2.023623 | cc/g STP | | |
| CORRELATION COEFFICIENT: | 9.99945E-01 | | | |

| RELATIVE PRESSURE | VOL ADSORBED (cc/g STP) | 1/ [VA(Po/P - 1)] |
|---|---|---|
| 0.0711 | 1.6817 | 0.045530 |
| 0.1075 | 1.8855 | 0.063872 |
| 0.1484 | 2.0840 | 0.083614 |
| 0.1877 | 2.2575 | 0.102358 |
| 0.2543 | 2.5426 | 0.134112 |

Micromeritics Instrument Corporation

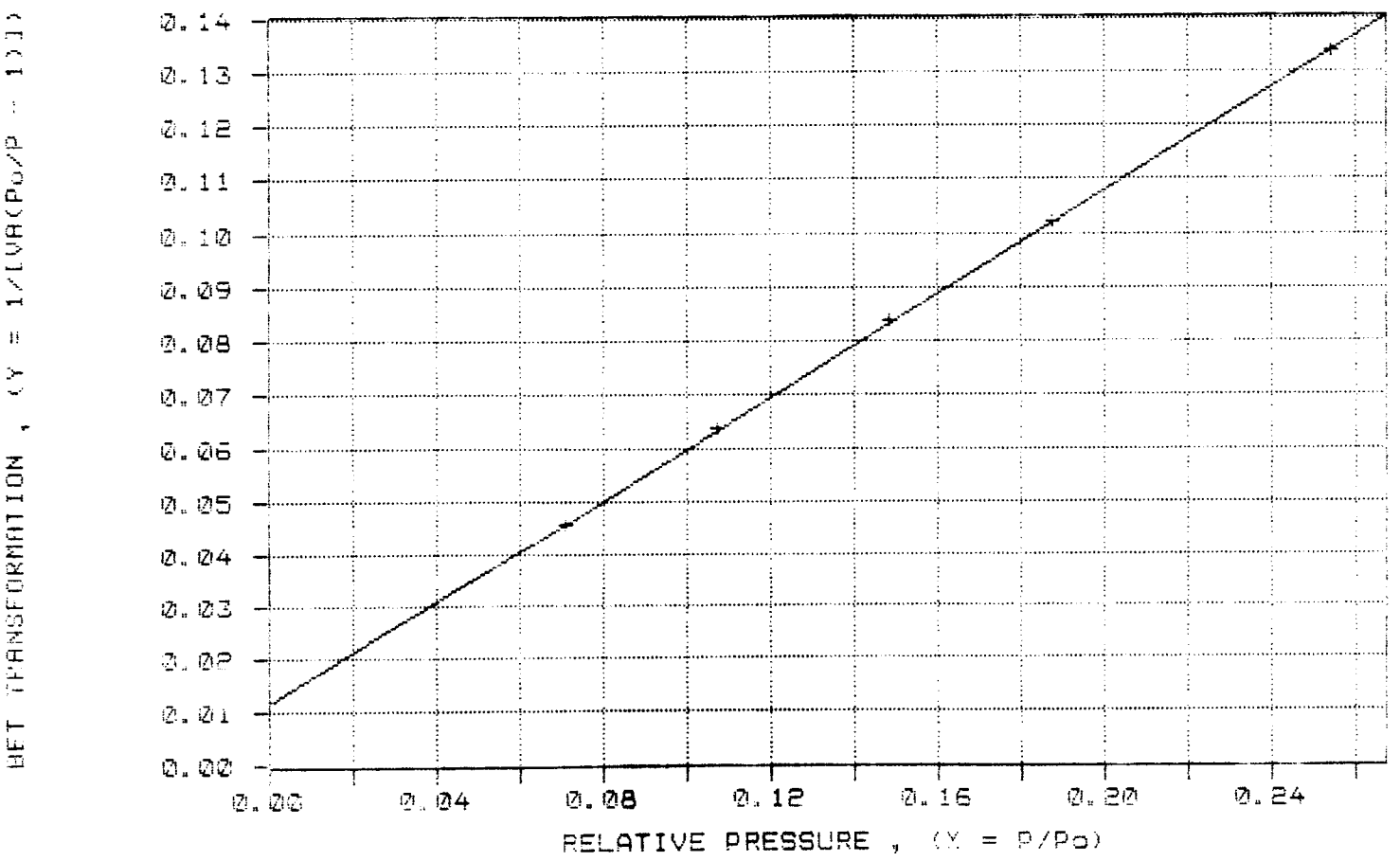
ASAP 2000 V2.00



SAMPLE DIRECTORY/NUMBER: DATA3 /214
SAMPLE ID: SAMPLE E MAL 1754 R
SUBMITTER: SOUTHWEST RESEARCH
OPERATOR: TK
UNIT NUMBER: 1
ANALYSIS GAS: Argon

START 10:51:57 08/28/91
COMPL 12:43:19 08/28/91
REPRT 13:58:44 08/28/91
SAMPLE WT: 1.3035 g
FREE SPACE: 53.2344 cc
EQUIL INTRVL: 15 sec

BET PLOT



SAMPLE DIRECTORY/NUMBER: DATA3 /214
SAMPLE ID: SAMPLE E MAL 1754 R
SUBMITTER: SOUTHWEST RESEARCH
OPERATOR: TK
UNIT NUMBER: 1
ANALYSIS GAS: Argon

START 10:51:57 08/28/91
COMPL 12:43:19 08/28/91
REPRT 13:58:44 08/28/91
SAMPLE WT: 1.3035 g
FREE SPACE: 53.2344 cc
EQUIL INTRVL: 15 sec

## MICROPORE ANALYSIS REPORT

MICROPORE VOLUME: -0.001009 cc/g
MICROPORE AREA: -2.9873 sq. m/g
EXTERNAL SURFACE AREA: 10.4914 sq. m/g
SLOPE: 0.678266 +/- 0.002182
Y-INTERCEPT: -0.652007 +/- 0.010794
CORRELATION COEFFICIENT: 9.99943E-01

| RELATIVE PRESSURE | STATISTICAL THICKNESS, (A ) | VOL ADSORBED (cc/g STP) |
|---|---|---|
| 0.0524 | 3.262 | 1.5490 |
| 0.0711 | 3.440 | 1.6817 |
| 0.0896 | 3.596 | 1.7923 |
| 0.1075 | 3.735 | 1.8855 |
| 0.1297 | 3.897 | 1.9947 |
| 0.1484 | 4.027 | 2.0840 |
| 0.1660 | 4.146 | 2.1625 |
| 0.1877 | 4.289 | 2.2575 |
| 0.2203 | 4.500 | 2.3975 |
| 0.2543 | 4.717 | 2.5426 |
| 0.3027 | 5.030 | 2.7492 |
| 0.3816 | 5.561 | 3.1072 |
| 0.4414 | 5.996 | 3.4066 |
| 0.4981 | 6.446 | 3.7219 |
| 0.5535 | 6.935 | 4.0689 |

THICKNESS VALUES USED IN THE LEAST-SQUARES ANALYSIS WERE BETWEEN 3.500 AND 8.000 A .

$$t = [\ 13.9900/(\ 0.0340 - \log(P/Po))]^{0.500}$$

SURFACE AREA CORRECTION FACTOR IS 1.000.

Micromeritics Instrument Corporation

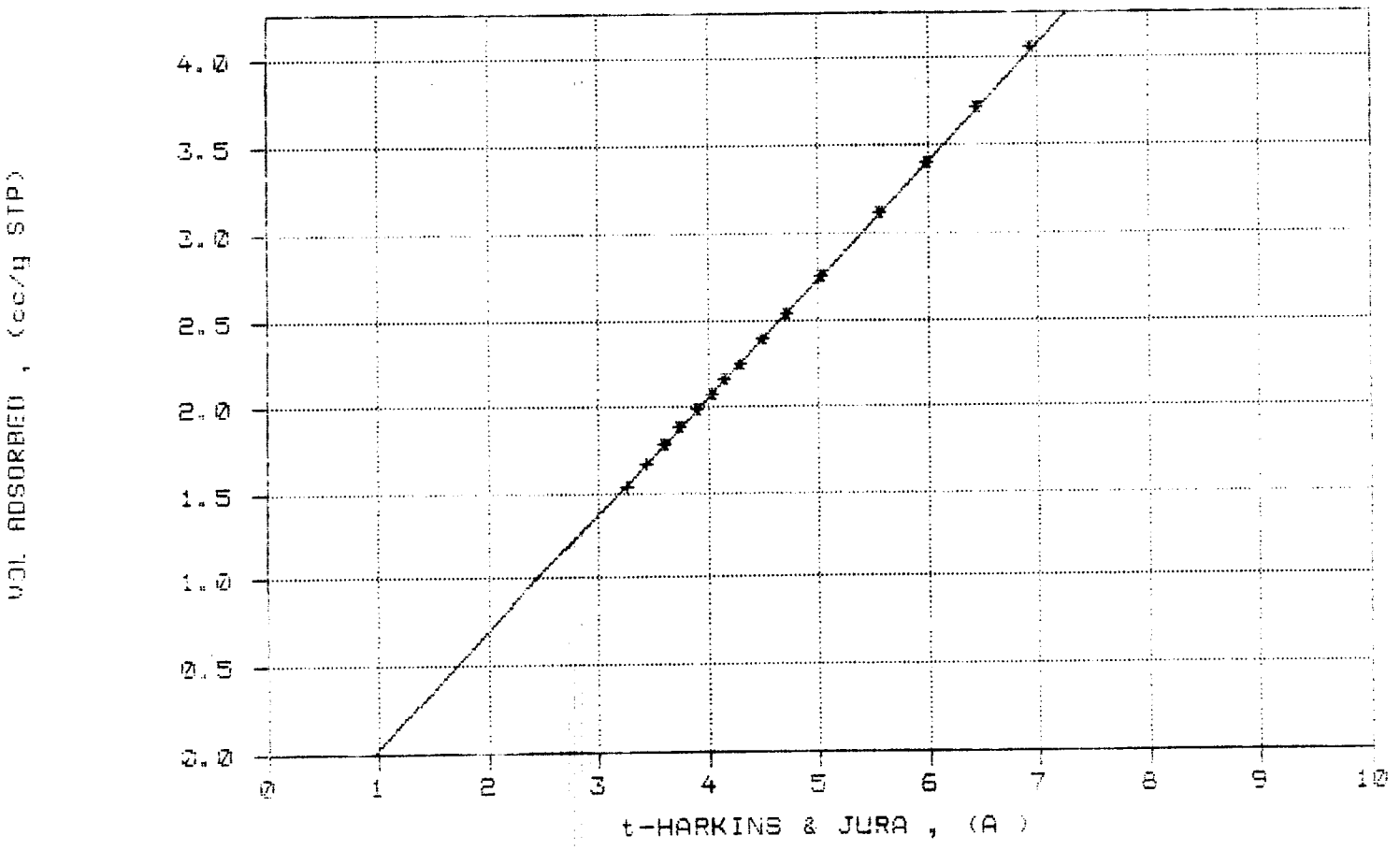
ASAP 2000 V2.00



SAMPLE DIRECTORY/NUMBER: DATA3 /214
SAMPLE ID: SAMPLE E MAL 1754 R
SUBMITTER: SOUTHWEST RESEARCH
OPERATOR: TK
UNIT NUMBER: 1
ANALYSIS GAS: Argon

START 10:51:57 08/26/91
COMPL 12:43:19 08/28/91
REPRT 13:58:44 08/28/91
SAMPLE WT: 1.3035 g
FREE SPACE: 53.2344 cc
EQUIL INTVL: 15 sec

T-PLOT
* fitted, + non-fitted



Micromeritics Instrument Corporation

ASAP 2000 V2.00 PAGE 6

SAMPLE DIRECTORY/NUMBER: DATA3 /214
SAMPLE ID: SAMPLE E MAL 1754 R
SUBMITTER: SOUTHWEST RESEARCH
OPERATOR: TK
UNIT NUMBER: 1
ANALYSIS GAS: Argon

START 10:51:57 08/28/91
COMPL 12:43:19 08/28/91
REPRT 13:58:44 08/28/91
SAMPLE WT: 1.3035 g
FREE SPACE: 53.2344 cc
EQUIL INTRVL: 15 sec

SUMMARY REPORT

AREA

| | | |
|---|---|---|
| BET SURFACE AREA: | 7.5042 | sq. m/g |
| SINGLE POINT SURFACE AREA AT P/Po 0.2543: | 7.0310 | sq. m/g |
| MICROPORE AREA: | -2.9873 | sq. m/g |

VOLUME

| | | |
|---|---|---|
| MICROPORE VOLUME: | -0.001009 | cc/g |

Micromeritics Instrument Corporation

ASAP 2000 V2.00 PAGE 1

SAMPLE DIRECTORY/NUMBER: DATA3 /215
SAMPLE ID: SAMPLE F MAL 1755 Q
SUBMITTER: SOUTHWEST RESEARCH
OPERATOR: TK
UNIT NUMBER: 1
ANALYSIS GAS: Argon

START 08:58:20 08/28/91
COMPL 10:21:47 08/28/91
REPRT 14:01:52 08/28/91
SAMPLE WT: 3.8653 g
FREE SPACE: 49.0464 cc
EQUIL INTRVL: 15 sec

ANALYSIS LOG

| RELATIVE PRESSURE | PRESSURE (mmHg) | VOL ADSORBED (cc/g STP) | ELAPSED TIME (HR:MN) | SATURATION PRESS. (mmHg) |
|---|---|---|---|---|
| | | | 0:34 | 193.542 |
| 0.0112 | 2.172 | 0.0229 | 0:40 | |
| 0.0310 | 5.999 | 0.0319 | 0:43 | |
| 0.0542 | 10.498 | 0.0379 | 0:47 | |
| 0.0775 | 14.997 | 0.0430 | 0:50 | |
| 0.0949 | 18.359 | 0.0456 | 0:53 | |
| 0.1130 | 21.875 | 0.0476 | 0:56 | |
| 0.1355 | 26.220 | 0.0510 | 1:00 | |
| 0.1702 | 32.942 | 0.0546 | 1:03 | |
| 0.2100 | 40.648 | 0.0588 | 1:06 | |
| 0.2611 | 50.526 | 0.0639 | 1:10 | |
| 0.3134 | 60.662 | 0.0692 | 1:13 | |
| 0.3987 | 77.159 | 0.0759 | 1:16 | |
| 0.4564 | 88.329 | 0.0810 | 1:20 | |
| 0.5702 | 110.360 | 0.0897 | 1:23 | |

Micromeritics Instrument Corporation

ASAP 2000 V2.00



SAMPLE DIRECTORY/NUMBER: DATA3 /215
SAMPLE ID: SAMPLE F MAL 1755 Q
SUBMITTER: SOUTHWEST RESEARCH
OPERATOR: TK
UNIT NUMBER: 1
ANALYSIS GAS: Argon

START 08:58:20 08/28/91
COMPL 10:21:47 08/28/91
REPRT 14:01:52 08/28/91
SAMPLE WT: 3.8653 g
FREE SPACE: 49.0464 cc
EQUIL INTRVL: 15 sec

BET SURFACE AREA REPORT

| | | | | |
|---|---|---|---|---|
| BET SURFACE AREA: | 0.1852 | +/- | 0.0010 | sq. m/g |
| SLOPE: | 19.590948 | +/- | 0.109341 | |
| Y-INTERCEPT: | 0.433146 | +/- | 0.020317 | |
| C: | 46.229424 | | | |
| VM: | 0.049940 | cc/g STP | | |
| CORRELATION COEFFICIENT: | 9.99953E-01 | | | |

| RELATIVE PRESSURE | VOL ADSORBED (cc/g STP) | 1/ [VA(Po/P - 1)] |
|---|---|---|
| 0.0542 | 0.0379 | 1.511640 |
| 0.0949 | 0.0456 | 2.296777 |
| 0.1355 | 0.0510 | 3.072426 |
| 0.2100 | 0.0588 | 4.522194 |
| 0.3134 | 0.0692 | 6.592640 |

Micromeritics Instrument Corporation

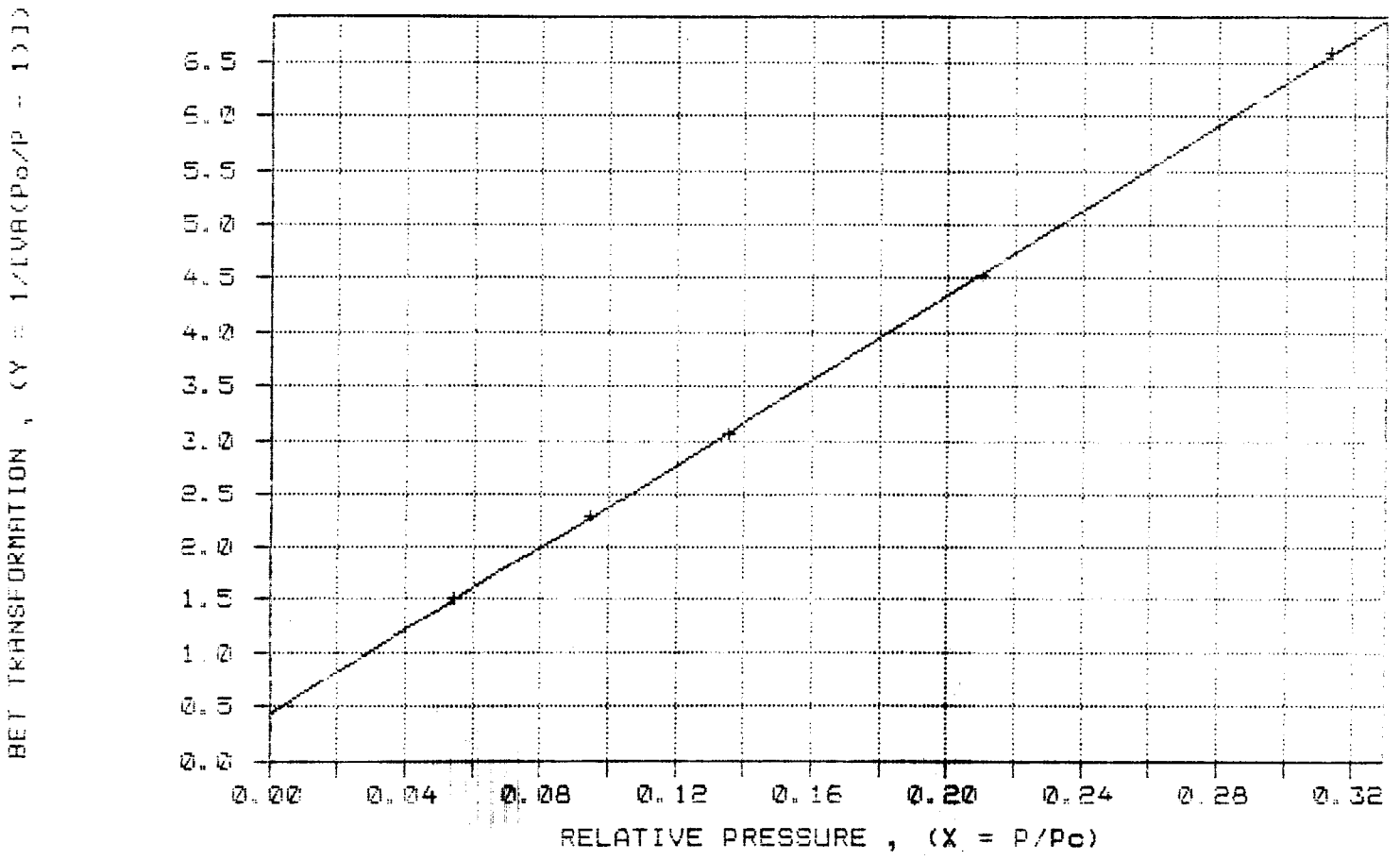
ASAP 2000 V2.00



SAMPLE DIRECTORY/NUMBER: DATA2 /215
SAMPLE ID: SAMPLE F **MAL 1755** Q
SUBMITTER: SOUTHWEST RESEARCH
OPERATOR: TK
UNIT NUMBER: 1
ANALYSIS GAS: Argon

START 08:58:20 08/28/91
COMPL 10:21:47 08/28/91
REPRT 14:01:52 08/28/91
SAMPLE WT: 3.8653 g
FREE SPACE: 49.0464 cc
EQUIL INTRVL: 15 sec

BET PLOT



SAMPLE DIRECTORY/NUMBER: DATA3 /215
SAMPLE ID: SAMPLE F MAL 1755 Q
SUBMITTER: SOUTHWEST RESEARCH
OPERATOR: TK
UNIT NUMBER: 1
ANALYSIS GAS: Argon

START 08:58:20 08/28/91
COMPL 10:21:47 08/28/91
REPRT 14:01:52 08/28/91
SAMPLE WT: 3.8653 g
FREE SPACE: 49.0464 cc
EQUIL INTRVL: 15 sec

## MICROPORE ANALYSIS REPORT

MICROPORE VOLUME: 0.000027 cc/g
MICROPORE AREA: 0.0273 sq. m/g
EXTERNAL SURFACE AREA: 0.1579 sq. m/g
SLOPE: 0.010209 +/- 0.000556
Y-INTERCEPT: 0.017712 +/- 0.003357
CORRELATION COEFFICIENT: 9.97050E-01

| RELATIVE PRESSURE | STATISTICAL THICKNESS,(A ) | VOL ADSORBED (cc/g STP) |
|---|---|---|
| 0.0542 | 3.281 | 0.0379 |
| 0.0775 | 3.496 | 0.0430 |
| 0.0949 | 3.638 | 0.0456 |
| 0.1130 | 3.777 | 0.0476 |
| 0.1355 | 3.938 | 0.0510 |
| 0.1702 | 4.174 | 0.0546 |
| 0.2100 | 4.434 | 0.0588 |
| 0.2611 | 4.761 | 0.0639 |
| 0.3134 | 5.100 | 0.0692 |
| 0.3987 | 5.682 | 0.0759 |
| 0.4564 | 6.111 | 0.0810 |
| 0.5702 | 7.094 | 0.0897 |

THICKNESS VALUES USED IN THE LEAST-SQUARES ANALYSIS WERE BETWEEN 5.000 AND 8.000 A .

$$t = [\ 13.9900/(\ 0.0340 - \log(P/Po))\ ]^{0.500}$$

SURFACE AREA CORRECTION FACTOR IS 1.000.

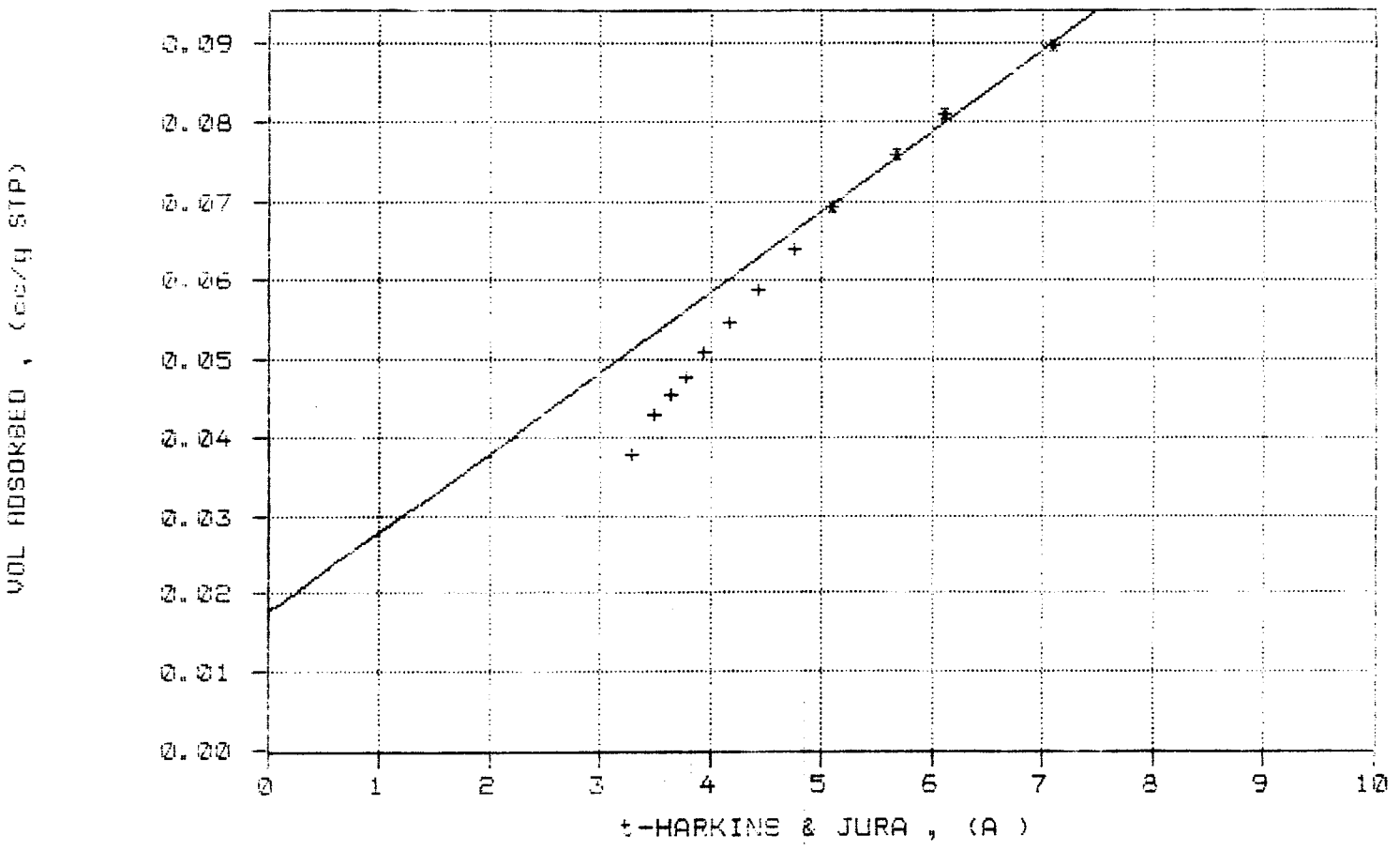
Micromeritics Instrument Corporation

ASAP 2000 V2.00 PAGE 5

SAMPLE DIRECTORY/NUMBER: DATA3 /215
SAMPLE ID: SAMPLE F MAL 1755 0
SUBMITTER: SOUTHWEST RESEARCH
OPERATOR: TK
UNIT NUMBER: 1
ANALYSIS GAS: Argon

START 08:58:20 08/28/91
COMPL 10:21:47 08/28/91
REPRT 14:01:52 08/28/91
SAMPLE WT: 3.8653 g
FREE SPACE: 49.0464 cc
EQUIL INTRVL: 15 sec

T-PLOT
* fitted, + non-fitted



Micromeritics Instrument Corporation

ASAP 2000 V2.00 PAGE 6

SAMPLE DIRECTORY/NUMBER: DATA3 /215
SAMPLE ID: SAMPLE F MAL 1755 Q
SUBMITTER: SOUTHWEST RESEARCH
OPERATOR: TK
UNIT NUMBER: 1
ANALYSIS GAS: Argon

START 08:58:20 08/28/91
COMPL 10:21:47 08/28/91
REPRT 14:01:52 08/28/91
SAMPLE WT: 3.8653 g
FREE SPACE: 49.0464 cc
EQUIL INTRVL: 15 sec

## SUMMARY REPORT

### AREA

| | | |
|---|---|---|
| BET SURFACE AREA: | 0.1852 | sq. m/g |
| SINGLE POINT SURFACE AREA AT P/Po 0.3134: | 0.1763 | sq. m/g |
| MICROPORE AREA: | 0.0273 | sq. m/g |

### VOLUME

| | | |
|---|---|---|
| MICROPORE VOLUME: | 0.000027 | cc/g |

Micromeritics Instrument Corporation

ASAP 2000 V2.00 

SAMPLE DIRECTORY/NUMBER: DATA3 /207
SAMPLE ID: SAMPLE G MAL 1756 S1
SUBMITTER: SOUTHWEST RESEARCH
OPERATOR: TK
UNIT NUMBER: 1
ANALYSIS GAS: Argon

START 07:06:13 08/27/91
COMPL 08:30:05 08/27/91
REPRT 09:02.30 08/27/91
SAMPLE WT: 5.1020 g
FREE SPACE: 46.8402 cc
EQUIL INTRVL: 15 sec

ANALYSIS LOG

| RELATIVE PRESSURE | PRESSURE (mmHg) | VOL ADSORBED (cc/g STP) | ELAPSED TIME (HR:MN) | SATURATION PRESS. (mmHg) |
|---|---|---|---|---|
| | | | 0:31 | 192.770 |
| 0.0110 | 2.120 | 0.0207 | 0.37 | |
| 0.0308 | 5.947 | 0.0278 | 0:40 | |
| 0.0544 | 10.498 | 0.0324 | 0:44 | |
| 0.0772 | 14.894 | 0.0363 | 0:47 | |
| 0.0951 | 18.359 | 0.0383 | 0:50 | |
| 0.1123 | 21.669 | 0.0396 | 0:54 | |
| 0.1359 | 26.220 | 0.0422 | 0:57 | |
| 0.1699 | 32.787 | 0.0446 | 1:00 | |
| 0.1924 | 37.131 | 0.0470 | 1:04 | |
| 0.2270 | 43.803 | 0.0503 | 1:07 | |
| 0.2615 | 50.474 | 0.0516 | 1:10 | |
| 0.3127 | 60.351 | 0.0556 | 1:14 | |
| 0.3982 | 76.848 | 0.0615 | 1:17 | |
| 0.4566 | 88.122 | 0.0651 | 1:20 | |
| 0.5705 | 110.101 | 0.0719 | 1:24 | |

Micromeritics Instrument Corporation

ASAP 2000 V2.00 PAGE 2

SAMPLE DIRECTORY/NUMBER: DATA3 /207
SAMPLE ID: SAMPLE G MAL 1756 S1
SUBMITTER: SOUTHWEST RESEARCH
OPERATOR: TK
UNIT NUMBER: 1
ANALYSIS GAS: Argon

START 07:06:13 08/27/91
COMPL 08:30:05 08/27/91
REPRT 09:02:30 08/27/91
SAMPLE WT: 5.1020 g
FREE SPACE: 46.8402 cc
EQUIL INTRVL: 15 sec

BET SURFACE AREA REPORT

| | | | | |
|---|---|---|---|---|
| BET SURFACE AREA: | 0.1495 | +/- | 0.0011 | sq. m/g |
| SLOPE: | 24.366867 | +/- | 0.178292 | |
| Y-INTERCEPT: | 0.433125 | +/- | 0.020373 | |
| C: | 57.258274 | | | |
| VM: | 0.040323 | cc/g STP | | |
| CORRELATION COEFFICIENT: | 9.99920E-01 | | | |

| RELATIVE PRESSURE | VOL ADSORBED (cc/g STP) | 1/ [VA(Po/P - 1)] |
|---|---|---|
| 0.0544 | 0.0324 | 1.774941 |
| 0.0772 | 0.0363 | 2.302773 |
| 0.0951 | 0.0383 | 2.745854 |
| 0.1359 | 0.0422 | 3.729330 |
| 0.1699 | 0.0446 | 4.586907 |

Micromeritics Instrument Corporation

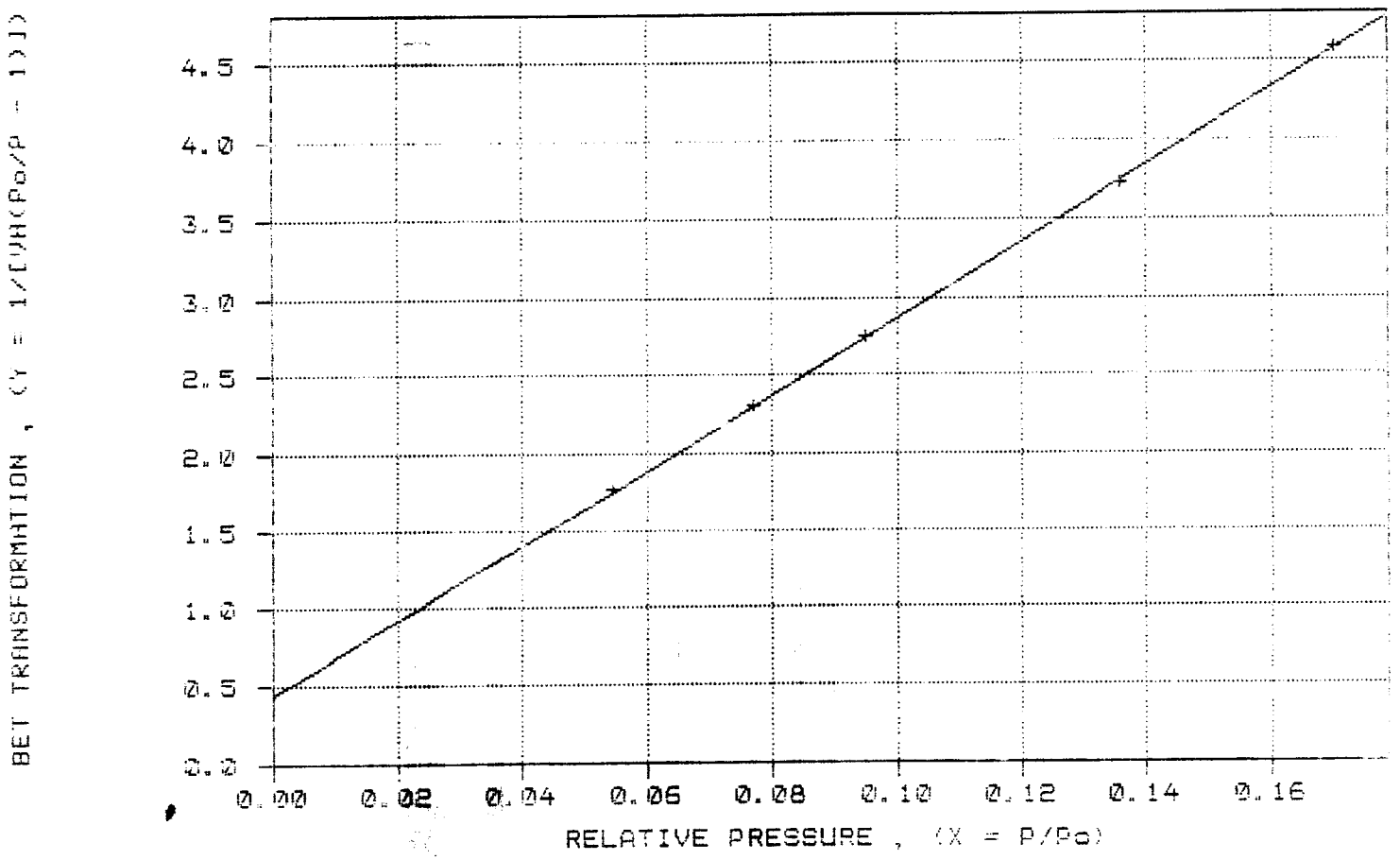
ASAP 2000 V2.00



SAMPLE DIRECTORY/NUMBER: DATA3 /207
SAMPLE ID: SAMPLE G MAL 1756 S1
SUBMITTER: SOUTHWEST RESEARCH
OPERATOR: TK
UNIT NUMBER: 1
ANALYSIS GAS: Argon

START 07:06:13 08/27/91
COMPL 08:30:05 08/27/91
REPRT 09:02:30 08/27/91
SAMPLE WT: 5.1020 g
FREE SPACE: 46.8402 cc
EQUIL INTRVL: 15 sec

BET PLOT



SAMPLE DIRECTORY/NUMBER: DATA3 /207
SAMPLE ID: SAMPLE G MAL 1756 51
SUBMITTER: SOUTHWEST RESEARCH
OPERATOR: TK
UNIT NUMBER: 1
ANALYSIS GAS: Argon

START 07:06:13 08/27/91
COMPL 08:30:05 08/27/91
REPRT 09:02:30 08/27/91
SAMPLE WT: 5.1020 g
FREE SPACE: 46.8402 cc
EQUIL INTRVL: 15 sec

## MICROPORE ANALYSIS REPORT

MICROPORE VOLUME: 0.000032 cc/g
MICROPORE AREA: 0.0375 sq. m/g
EXTERNAL SURFACE AREA: 0.1120 sq. m/g
SLOPE: 0.007244 +/- 0.000284
Y-INTERCEPT: 0.020576 +/- 0.001796
CORRELATION COEFFICIENT: 9.99232E-01

| RELATIVE PRESSURE | STATISTICAL THICKNESS,(A ) | VOL ADSORBED (cc/g STP) |
|---|---|---|
| 0.0544 | 3.282 | 0.0324 |
| 0.0772 | 3.493 | 0.0363 |
| 0.0951 | 3.640 | 0.0383 |
| 0.1123 | 3.771 | 0.0396 |
| 0.1359 | 3.941 | 0.0422 |
| 0.1699 | 4.172 | 0.0446 |
| 0.1924 | 4.320 | 0.0470 |
| 0.2270 | 4.542 | 0.0503 |
| 0.2615 | 4.764 | 0.0516 |
| 0.3127 | 5.095 | 0.0556 |
| 0.3982 | 5.678 | 0.0615 |
| 0.4566 | 6.112 | 0.0651 |
| 0.5705 | 7.097 | 0.0719 |

THICKNESS VALUES USED IN THE LEAST-SQUARES ANALYSIS WERE BETWEEN 5.500 AND 8.000 A .

$$t = [\ 13.9900/(\ 0.0340 - \log(P/Po))]^{0.500}$$

SURFACE AREA CORRECTION FACTOR IS 1.000.

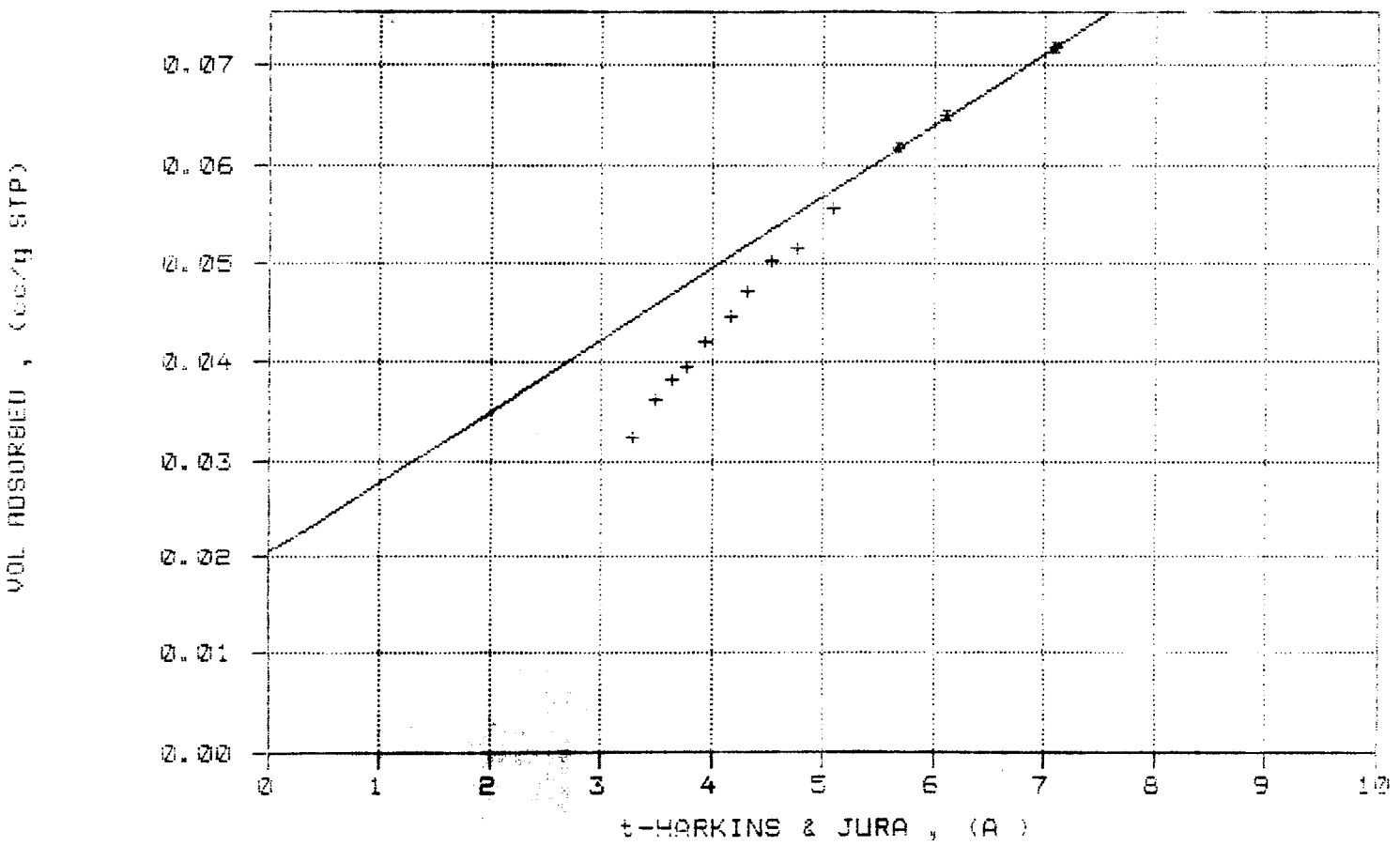
Micromeritics Instrument Corporation

ASAP 2000 V2.00 PAGE 5

SAMPLE DIRECTORY/NUMBER: DATA3 /207
SAMPLE ID: SAMPLE G MAL 1756 S1
SUBMITTER: SOUTHWEST RESEARCH
OPERATOR: TK
UNIT NUMBER: 1
ANALYSIS GAS: Argon

START 07:06:13 08/27/91
COMPL 08:30:05 08/27/91
REPRT 09:02:30 08/27/91
SAMPLE WT: 5.1020 g
FREE SPACE: 46.8402 cc
EQUIL INTRVL: 15 sec

T-PLOT
* fitted, + non-fitted



SAMPLE DIRECTORY/NUMBER: DATA3 /207
SAMPLE ID: SAMPLE G MAL 1756 S1
SUBMITTER: SOUTHWEST RESEARCH
OPERATOR: TK
UNIT NUMBER: 1
ANALYSIS GAS: Argon

START 07:06:13 08/27/91
COMPL 08:30:05 08/27/91
REPRT 09:02:50 08/27/91
SAMPLE WT: 5.1020 g
FREE SPACE: 46.5402 cc
EQUIL INTRVL: 15 sec

## SUMMARY REPORT

### AREA

| | | |
|---|---|---|
| BET SURFACE AREA: | 0.1495 | sq. m/g |
| SINGLE POINT SURFACE AREA AT P/Po 0.1699: | 0.1373 | sq. m/g |
| MICROPORE AREA: | 0.0375 | sq. m/g |

### VOLUME

| | | |
|---|---|---|
| MICROPORE VOLUME: | 0.000032 | cc/g |

Micromeritics Instrument Corporation

ASAP 2000 V2.00 PAGE 1

SAMPLE DIRECTORY/NUMBER: DATA3 /205
SAMPLE ID: SAMPLE H MAL 1757 S2
SUBMITTER: SOUTHWEST RESEARCH
OPERATOR: TK
UNIT NUMBER: 1
ANALYSIS GAS: Argon

START 12:45:13 08/26/91
COMPL 14:33:26 08/26/91
REPRT 15:24:31 08/26/91
SAMPLE WT: 5.4137 g
FREE SPACE: 50.5495 cc
EQUIL INTRVL: 15 sec

ANALYSIS LOG

| RELATIVE PRESSURE | PRESSURE (mmHg) | VOL ADSORBED (cc/g STP) | ELAPSED TIME (HR:MN) | SATURATION PRESS. (mmHg) |
|---|---|---|---|---|
| | | | 0:37 | 192.108 |
| 0.0097 | 1.862 | 0.1762 | 0:54 | |
| 0.0302 | 5.792 | 0.2603 | 1:00 | |
| 0.0525 | 10.084 | 0.3081 | 1:05 | |
| 0.0716 | 13.756 | 0.3381 | 1:08 | |
| 0.0899 | 17.273 | 0.3627 | 1:11 | |
| 0.1077 | 20.686 | 0.3840 | 1:15 | |
| 0.1306 | 25.092 | 0.4080 | 1:18 | |
| 0.1491 | 28.650 | 0.4263 | 1:21 | |
| 0.1669 | 32.063 | 0.4419 | 1:25 | |
| 0.1887 | 36.252 | 0.4613 | 1:28 | |
| 0.2213 | 42.510 | 0.4890 | 1:31 | |
| 0.2563 | 49.233 | 0.5164 | 1:35 | |
| 0.3055 | 58.697 | 0.5541 | 1:38 | |
| 0.3858 | 74.108 | 0.6155 | 1:41 | |
| 0.4471 | 85.899 | 0.6616 | 1:45 | |
| 0.5045 | 96.914 | 0.7080 | 1:48 | |

Micromeritics Instrument Corporation

ASAP 2000 V2.00 PAGE 2

SAMPLE DIRECTORY/NUMBER: DATA3 /205
SAMPLE ID: SAMPLE 4 MAL 1757 82
SUBMITTER: SOUTHWEST RESEARCH
OPERATOR: TK
UNIT NUMBER: 1
ANALYSIS GAS: Argon

START 12:45:13 08/26/91
COMPL 14:33:36 08/26/91
REPRT 15:24:31 08/26/91
SAMPLE WT: 5.4137 g
FREE SPACE: 50.5495 cc
EQUIL INTRVL: 15 sec

## BET SURFACE AREA REPORT

| | | | | |
|---|---|---|---|---|
| BET SURFACE AREA: | 1.5268 | +/- | 0.0085 | sq. m/g |
| SLOPE: | 2.371381 | +/- | 0.013456 | |
| Y-INTERCEPT: | 0.057380 | +/- | 0.001947 | |
| C: | 42.327747 | | | |
| VM: | 0.411733 | cc/g STP | | |
| CORRELATION COEFFICIENT: | 9.99952E-01 | | | |

| RELATIVE PRESSURE | VOL ADSORBED (cc/g STP) | 1/ [VA(Po/P - 1)] |
|---|---|---|
| 0.0525 | 0.3081 | 0.179845 |
| 0.0899 | 0.3627 | 0.272415 |
| 0.1306 | 0.4080 | 0.368025 |
| 0.1669 | 0.4419 | 0.453311 |
| 0.2213 | 0.4890 | 0.581144 |

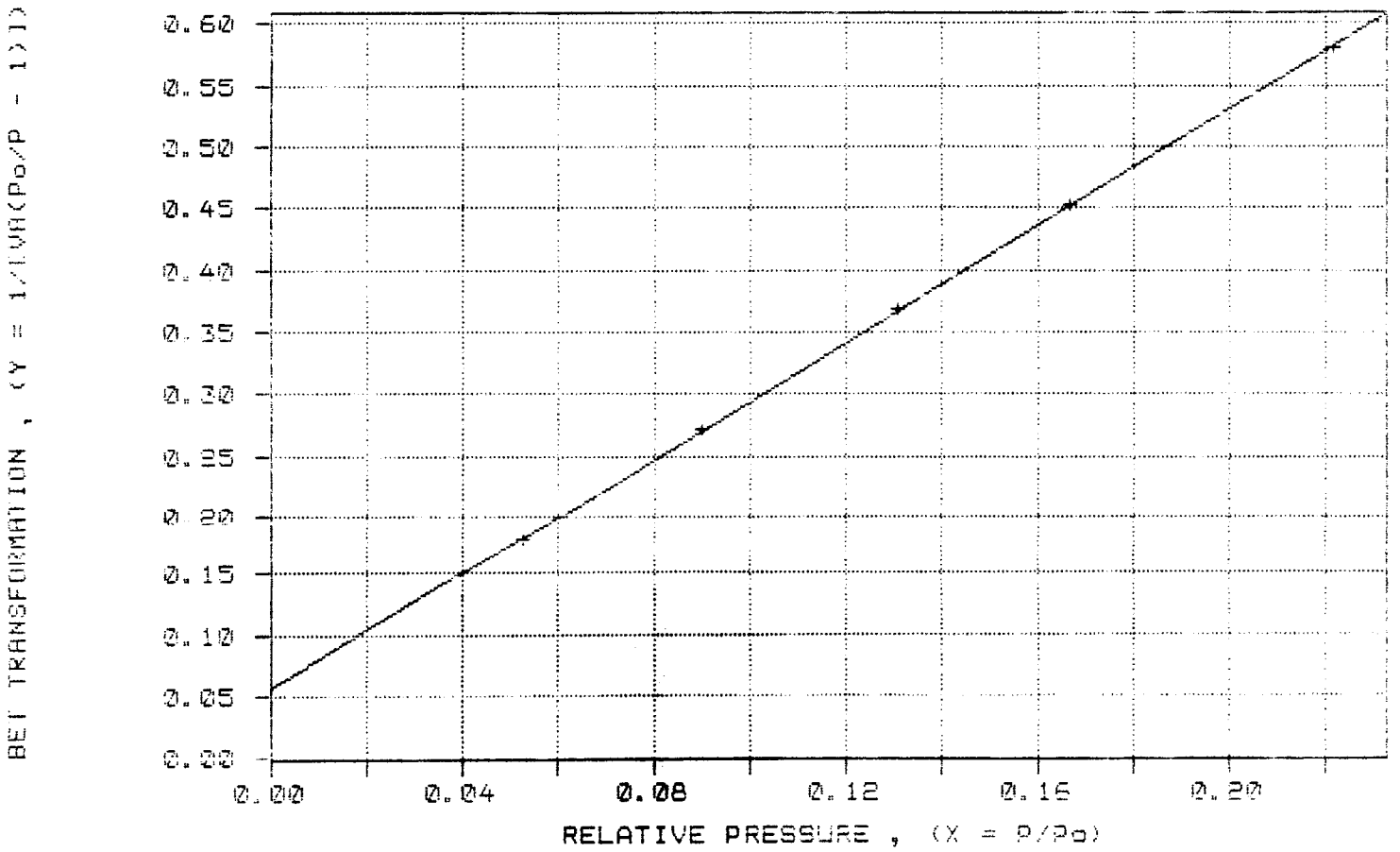
Micromeritics Instrument Corporation

ASAP 2000 V2.00 PAGE 3

SAMPLE DIRECTORY/NUMBER: DATA3 /205
SAMPLE ID: SAMPLE 4 MAL 1757 S2
SUBMITTER: SOUTHWEST RESEARCH
OPERATOR: TK
UNIT NUMBER: 1
ANALYSIS GAS: Argon

START 12:45:13 06/26/91
COMPL 14:33:26 06/26/91
REPRT 15:24:31 08/26/91
SAMPLE WT: 5.4137 g
FREE SPACE: 50.5495 cc
EQUIL INTRVL: 15 sec

BET PLOT



SAMPLE DIRECTORY/NUMBER: DATA3 /205
SAMPLE ID: SAMPLE H MAL 1757 S2
SUBMITTER: SOUTHWEST RESEARCH
OPERATOR: TK
UNIT NUMBER: 1
ANALYSIS GAS: Argon

START 12:45:13 08/26/91
COMPL 14:43:26 08/26/91
REPRT 15:24:31 08/26/91
SAMPLE WT: 5.4137 g
FREE SPACE: 50.5495 cc
EQUIL INTRVL: 15 sec

## MICROPORE ANALYSIS REPORT

MICROPORE VOLUME: 0.000011 cc/g
MICROPORE AREA: -0.1474 sq. m/g
EXTERNAL SURFACE AREA: 1.6742 sq. m/g
SLOPE: 0.108237 +/- 0.002059
Y-INTERCEPT: 0.006987 +/- 0.011566
CORRELATION COEFFICIENT: 9.99458E-01

| RELATIVE PRESSURE | STATISTICAL THICKNESS,(A ) | VOL ADSORBED (cc/g STP) |
|---|---|---|
| 0.0525 | 3.263 | 0.3081 |
| 0.0716 | 3.445 | 0.3381 |
| 0.0899 | 3.599 | 0.3627 |
| 0.1077 | 3.737 | 0.3840 |
| 0.1306 | 3.903 | 0.4080 |
| 0.1491 | 4.032 | 0.4263 |
| 0.1669 | 4.152 | 0.4419 |
| 0.1887 | 4.296 | 0.4613 |
| 0.2213 | 4.506 | 0.4890 |
| 0.2563 | 4.730 | 0.5164 |
| 0.3055 | 5.048 | 0.5541 |
| 0.3858 | 5.590 | 0.6155 |
| 0.4471 | 6.039 | 0.6616 |
| 0.5045 | 6.500 | 0.7060 |

THICKNESS VALUES USED IN THE LEAST-SQUARES ANALYSIS
WERE BETWEEN 4.600 AND 8.000 A .

$$t = [\ 13.9900/(\ 0.0340 - \log(P/Po))\ ]^{0.500}$$

SURFACE AREA CORRECTION FACTOR IS 1.000.

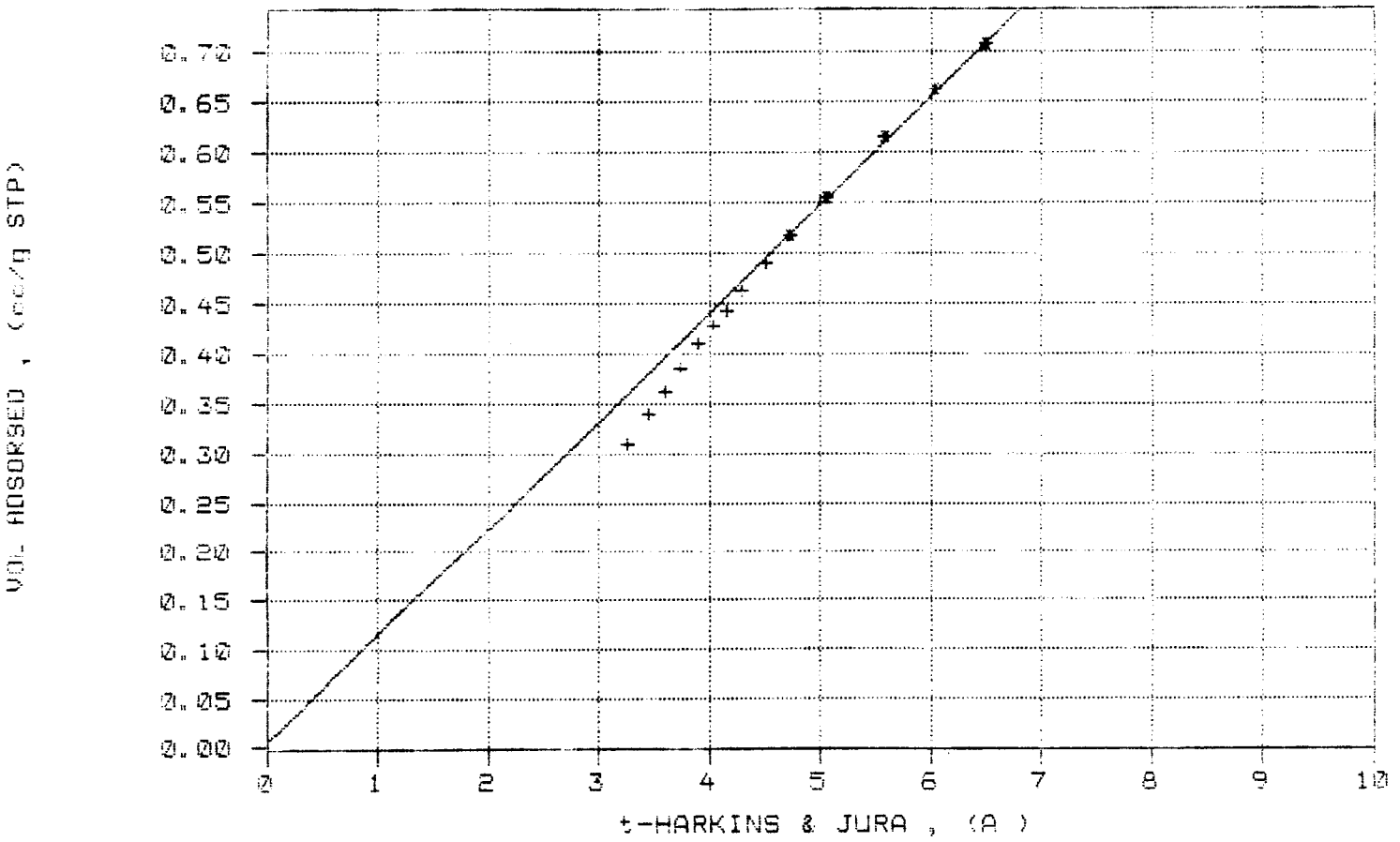
Micromeritics Instrument Corporation

ASAP 2000 V2.00 PAGE 5

SAMPLE DIRECTORY/NUMBER: DATA3 /205
SAMPLE ID: SAMPLE 4 MAL 1757 S2
SUBMITTER: SOUTHWEST RESEARCH
OPERATOR: TK
UNIT NUMBER: 1
ANALYSIS GAS: Argon

START 12:45:13 08/26/91
COMPL 14:33:26 08/26/91
REPRT 15:24:31 08/26/91
SAMPLE WT: 5.4137 g
FREE SPACE: 50.5495 cc
EQUIL INTRVL: 15 sec

T-PLOT
* fitted, + non-fitted



Micromeritics Instrument Corporation

ASAP 2000 V2.00 PAGE 6

SAMPLE DIRECTORY/NUMBER: DATA3 /205
SAMPLE ID: SAMPLE H MAL 1757 62
SUBMITTER: SOUTHWEST RESEARCH
OPERATOR: TK
UNIT NUMBER: 1
ANALYSIS GAS: Argon

START 12:45:13 08/26/91
COMPL 14:33:26 08/26/91
REPRT 15:24:31 08/26/91
SAMPLE WT: 5.4137 g
FREE SPACE: 50.5495 cc
EQUIL INTRVL: 15 sec

## SUMMARY REPORT

### AREA

| | | |
|---|---|---|
| BET SURFACE AREA: | 1.5268 | sq. m/g |
| SINGLE POINT SURFACE AREA AT P/Po 0.2213: | 1.4120 | sq. m/g |
| MICROPORE AREA: | -0.1474 | sq. m/g |

### VOLUME

| | | |
|---|---|---|
| MICROPORE VOLUME: | 0.000011 | cc/g |

Micromeritics Instrument Corporation

ASAP 2000 V2.00 PAGE 1

SAMPLE DIRECTORY/NUMBER: DATA3 /206
SAMPLE ID: SAMPLE I MAL 1758 11
SUBMITTER: SOUTHWEST RESEARCH
OPERATOR: TK
UNIT NUMBER: 1
ANALYSIS GAS: Argon

START 15:17:15 08/26/91
COMPL 17:09:48 08/26/91
REPRT 07:06:20 08/27/91
SAMPLE WT: 1.3523 g
FREE SPACE: 33.3673 cc
EQUIL INTRVL: 15 sec

ANALYSIS LOG

| RELATIVE PRESSURE | PRESSURE (mmHg) | VOL ADSORBED (cc/g STP) | ELAPSED TIME (HR:MN) | SATURATION PRESS. (mmHg) |
|---|---|---|---|---|
| | | | 0:36 | 191.428 |
| 0.0100 | 1.913 | 0.9615 | 0:54 | |
| 0.0303 | 5.792 | 1.4391 | 1:01 | |
| 0.0513 | 9.826 | 1.6805 | 1:06 | |
| 0.0700 | 13.394 | 1.8295 | 1:09 | |
| 0.0881 | 16.859 | 1.9579 | 1:12 | |
| 0.1064 | 20.376 | 2.0694 | 1:16 | |
| 0.1289 | 24.668 | 2.1992 | 1:19 | |
| 0.1475 | 28.236 | 2.3030 | 1:22 | |
| 0.1653 | 31.650 | 2.3900 | 1:26 | |
| 0.1872 | 35.838 | 2.5000 | 1:29 | |
| 0.2191 | 41.941 | 2.6584 | 1:32 | |
| 0.2534 | 48.509 | 2.8225 | 1:36 | |
| 0.3015 | 57.714 | 3.0492 | 1:39 | |
| 0.3788 | 72.504 | 3.4301 | 1:42 | |
| 0.4395 | 84.140 | 3.7560 | 1:46 | |
| 0.4960 | 94.949 | 4.0865 | 1:49 | |
| 0.5514 | 105.550 | 4.4513 | 1:52 | |

SAMPLE DIRECTORY/NUMBER: DATA3 /206
SAMPLE ID: SAMPLE I MAL 1758 T1
SUBMITTER: SOUTHWEST RESEARCH
OPERATOR: TK
UNIT NUMBER: 1
ANALYSIS GAS: Argon

START 15:17:15 08/26/91
COMPL 17:09:48 08/26/91
REPRT 07:58:20 08/27/91
SAMPLE WT: 1.3523 g
FREE SPACE: 53.3673 cc
EQUIL INTRVL: 15 sec

## BET SURFACE AREA REPORT

| | | | | |
|---|---|---|---|---|
| BET SURFACE AREA: | 8.3937 | +/- | 0.0497 | sq. m/g |
| SLOPE: | 0.430357 | +/- | 0.002582 | |
| Y-INTERCEPT: | 0.011436 | +/- | 0.000428 | |
| C: | 38.630871 | | | |
| VM: | 2.263504 | cc/g STP | | |
| CORRELATION COEFFICIENT: | 9.99946E-01 | | | |

| RELATIVE PRESSURE | VOL ADSORBED (cc/g STP) | 1/ [VA(Po/P - 1)] |
|---|---|---|
| 0.0700 | 1.8295 | 0.041122 |
| 0.1064 | 2.0694 | 0.057562 |
| 0.1475 | 2.3030 | 0.075131 |
| 0.1872 | 2.5000 | 0.092135 |
| 0.2534 | 2.8225 | 0.120254 |

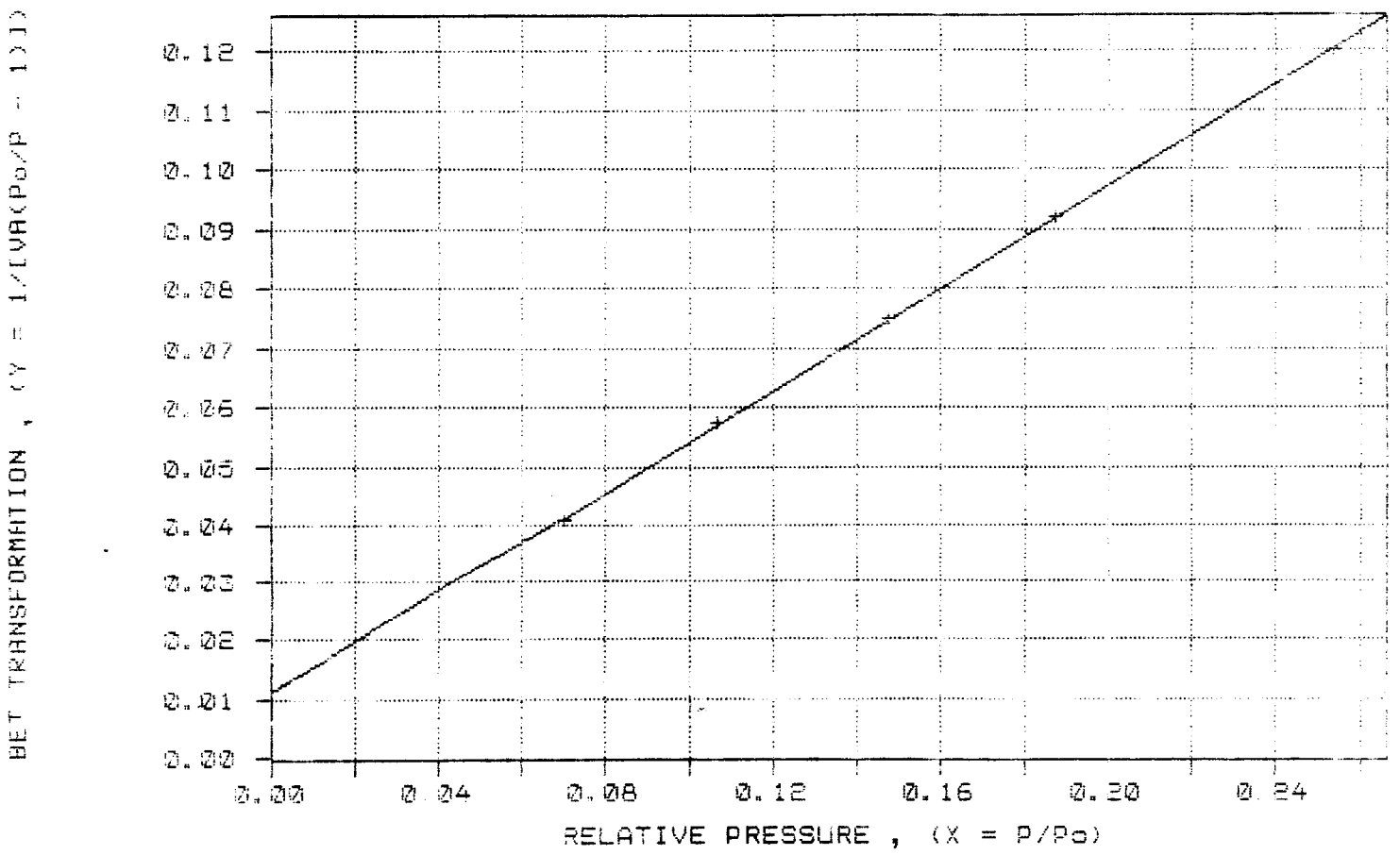
Micromeritics Instrument Corporation

ASAP 2000 V2.00 PAGE 3

SAMPLE DIRECTORY/NUMBER: DATA3 /20A
SAMPLE ID: SAMPLE / MAL 1/58 11
SUBMITTER: SOUTHWEST RESEARCH
OPERATOR: TK
UNIT NUMBER: 1
ANALYSIS GAS: Argon

START 15:17:15 08/26/91
COMPL 17:09:48 08/26/91
REPRT 07:58:20 08/27/91
SAMPLE WT: 1.3523 g
FREE SPACE: 53.3673 cc
EQUIL INTRVL: 15 sec

BET PLOT



SAMPLE DIRECTORY/NUMBER: DATA3 /206
SAMPLE ID: SAMPLE I MAL 1758 T1
SUBMITTER: SOUTHWEST RESEARCH
OPERATOR: TK
UNIT NUMBER: 1
ANALYSIS GAS: Argon

START 15:17:15 08/26/91
COMPL 17:09:48 08/26/91
REPRT 07:58:20 09/27/91
SAMPLE WT: 1.3523 g
FREE SPACE: 53.3673 cc
EQUIL INTRVL: 15 sec

## MICROPORE ANALYSIS REPORT

MICROPORE VOLUME: -0.001080 cc/g
MICROPORE AREA: -3.1321 sq. m/g
EXTERNAL SURFACE AREA: 11.5258 sq. m/g
SLOPE: 0.745136 +/- 0.002017
Y-INTERCEPT: -0.698369 +/- 0.009957
CORRELATION COEFFICIENT: 9.99960E-01

| RELATIVE PRESSURE | STATISTICAL THICKNESS,(A ) | VOL ADSORBED (cc/g STP) |
|---|---|---|
| 0.0513 | 3.251 | 1.6805 |
| 0.0700 | 3.430 | 1.8295 |
| 0.0881 | 3.584 | 1.9579 |
| 0.1064 | 3.727 | 2.0694 |
| 0.1289 | 3.891 | 2.1992 |
| 0.1475 | 4.021 | 2.3030 |
| 0.1653 | 4.142 | 2.3900 |
| 0.1872 | 4.286 | 2.5000 |
| 0.2191 | 4.492 | 2.6584 |
| 0.2534 | 4.712 | 2.8225 |
| 0.3015 | 5.022 | 3.0492 |
| 0.3788 | 5.541 | 3.4301 |
| 0.4395 | 5.982 | 3.7560 |
| 0.4960 | 6.429 | 4.0865 |
| 0.5514 | 6.915 | 4.4513 |

THICKNESS VALUES USED IN THE LEAST-SQUARES ANALYSIS WERE BETWEEN 3.500 AND 8.000 A .

$$t = [\ 13.9900/(\ 0.0340 - \log(P/Po))]^{0.500}$$

SURFACE AREA CORRECTION FACTOR IS 1.000.

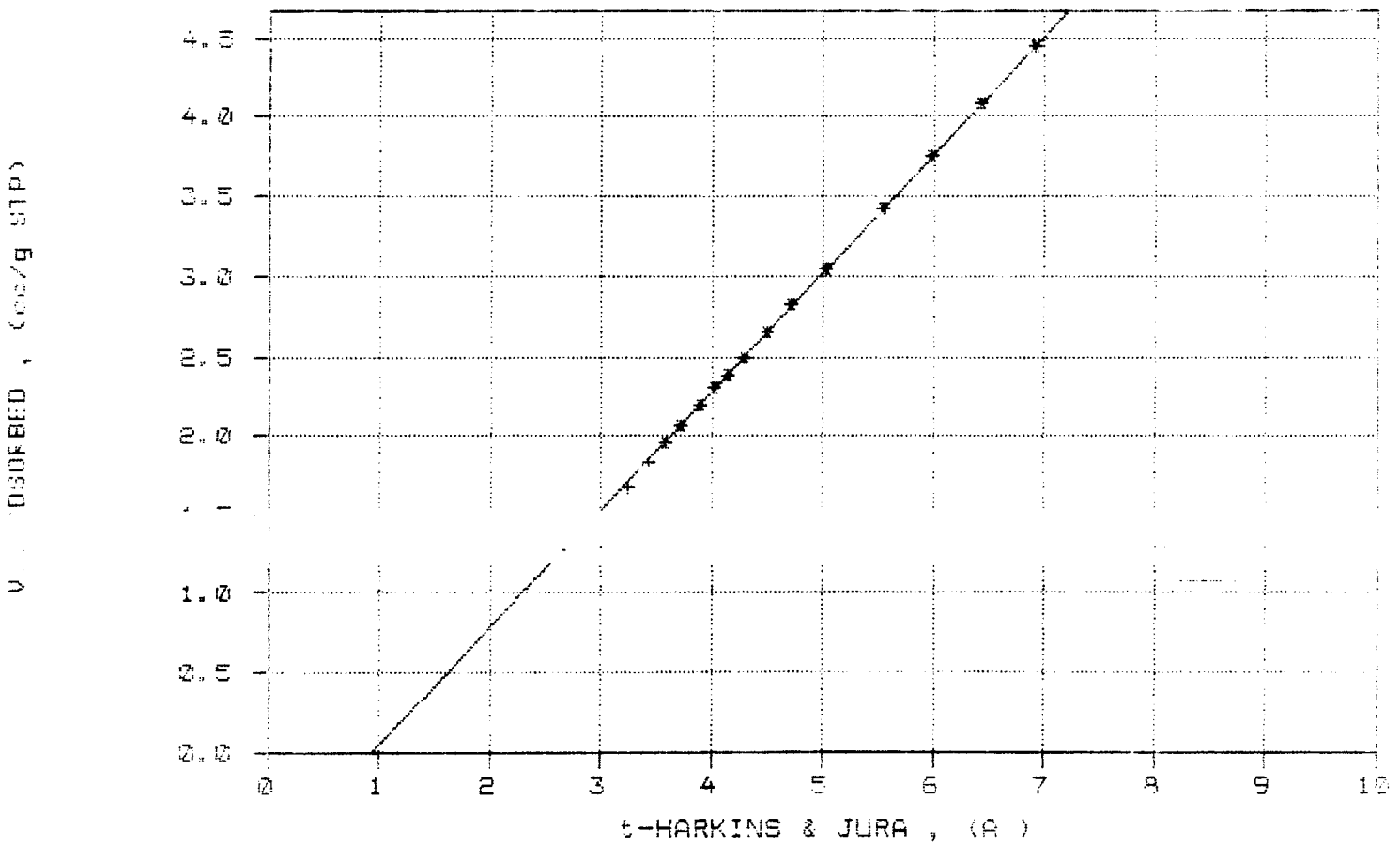
Micromeritics Instrument Corporation

ASAP 2000 V2.00 PAGE 5

SAMPLE DIRECTORY/NUMBER: DATA3 /206
SAMPLE ID: SAMPLE 1 MAL 1758 F1
SUBMITTER: SOUTHWEST RESEARCH
OPERATOR: TK
UNIT NUMBER: 1
ANALYSIS GAS: Argon

START 15:17:13 08/26/91
COMPL 17:09:48 08/26/91
REPRT 07:58:20 08/27/91
SAMPLE WT: 1.3523 g
FREE SPACE: 53.3673 cc
EQUIL INTRVL: 15 sec

T-PLOT
* fitted, + non-fitted



SAMPLE DIRECTORY/NUMBER: DATA3 /206
SAMPLE ID: SAMPLE I MAL 1758 T1
SUBMITTER: SOUTHWEST RESEARCH
OPERATOR: TK
UNIT NUMBER: 1
ANALYSIS GAS: Argon

START 15:17:15 08/26/91
COMPL 17:09:48 08/26/91
REPRT 07:58:20 08/27/91
SAMPLE WT: 1.3523 g
FREE SPACE: 53.3673 cc
EQUIL INTRVL: 15 sec

## SUMMARY REPORT

### AREA

| | | |
|---|---|---|
| BET SURFACE AREA: | 8.3937 | sq. m/g |
| SINGLE POINT SURFACE AREA AT P/Po 0.2534: | 7.8142 | sq. m/g |
| MICROPORE AREA: | -3.1321 | sq. m/g |

### VOLUME

| | | |
|---|---|---|
| MICROPORE VOLUME: | -0.001080 | cc/g |

FIRST IN POWDER TECHNOLOGY

5 Aerial Way, P.O. Box 9011
Syosset, New York 11791-9011
Phone: 516-935-2240
Fax: 516-935-2194
Telex: 510 221 2239

SOUTHWEST RESEARCH INSTITUTE
Mr. Roberto T. Pabalan
Sr. Research Scientist
6220 Culebra Road
Post Office Drawer 28510
San Antonio, Texas 78228-0510

DATE: 11/24/93

OUR REF.NO. 93-1366

YR.P.O.NO. 92276

Dear Mr. Pabalan:

Enclosed are the results obtained on your samples Note: Data and samples will only be kept for 6 months from the above date. Thank you for submitting your samples to Quantachrome Corporation. If there are any questions, please do not hesitate to contact us.

Submitted by:

QUANTACHROME CORPORATION

Enclosures

TO EXPEDITE PAYMENT, PLEASE ADVISE YOUR PAYABLE DEPT. THAT YOUR HAVE RECEIVED YOUR ANALYTICAL SERVICE RESULTS AND YOUR P.O. IS COMPLETED.

**Quantachrome Corporation**
**Quantachrome Autosorb Automated Gas Sorption System Report**
**Micropore Version 2.40**

Sample ID..... SRWI-A
Sample Description.....
Comments..... Southwest Research Institute
Gas Type..... Nitrogen

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Cross-Sec Area.. | 16.2 | Å² | Corr Factor.. | 6.580E-05 | Molec Wgt.. | 28.0134 |
| Sample Weight... | 5.4465 | g | P/Po Toler... | 2 | File Name.. | AS3B1102.RAW |
| Analysis Time... | 57.2 | min | Equil Time... | 3 | Operator... | BEM |
| Outgas Time..... | 24.0 | hrs | Outgas Temp.. | 250 °C | Station #.. | 1 |

End of Run..... 11-11-93 02:36pm

**MULTI-POINT BET**

| P/Po | Volume cc/g STP | 1/[W((Po/P)-1)] |
|---|---|---|
| 5.5583e-02 | 0.0222 | 2.124E+03 |
| 1.0802e-01 | 0.0251 | 3.867E+03 |
| 1.5804e-01 | 0.0278 | 5.404E+03 |
| 2.0794e-01 | 0.0294 | 7.133E+03 |

Area = 1.056E-01 m²/g

Slope = 3.266E+04

Y - Intercept = 3.080E+02

Correlation Coefficient = 0.9998

C = 1.071E+02

**Quantachrome Corporation**
**Quantachrome Autosorb Automated Gas Sorption System Report**
**Micropore Version 2.40**

Sample ID..... SWRI-B
Sample Description.....
Comments..... Southwest Research Institute
Gas Type..... Nitrogen

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Cross-Sec Area.. | 16.2 | Å² | Corr Factor.. | 6.580E-05 | Molec Wgt.. | 28.0134 |
| Sample Weight... | 2.6983 | g | P/Po Toler... | 2 | File Name.. | AS3B2203.RAW |
| Analysis Time... | 63.6 | min | Equil Time... | 3 | Operator... | BEM |
| Outgas Time..... | 48.0 | hrs | Outgas Temp.. | 250 °C | Station #.. | 1 |

End of Run..... 11-22-93 16:44pm

**MULTI-POINT BET**

| P/Po | Volume cc/g STP | 1/[W((Po/P)-1)] |
|---|---|---|
| 1.0107e-01 | 2.6934 | 3.340E+01 |
| 1.5229e-01 | 2.9133 | 4.934E+01 |
| 1.9837e-01 | 3.0848 | 6.418E+01 |
| 2.4712e-01 | 3.2637 | 8.047E+01 |

Area = 1.079E+01 m²/g

Slope = 3.222E+02

Y - Intercept = 5.551E-01

Correlation Coefficient = 0.9999

C = 5.814E+02

# Quantachrome Corporation
## Quantachrome Autosorb Automated Gas Adsorption System Report
## 6 ANYGAS Version 2.30

Sample ID..... SWRI-C
Sample Description.....
Comments..... Southwest Research Institute
Gas Type..... Nitrogen

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Cross-Sec Area.. | 16.2 | $A^2$ | Corr Factor.. | 6.580E-05 | Molec Wgt.. | 28.0134 |
| Sample Weight... | 4.9764 | g | P/Po Toler... | 2 | File Name.. | A33B1704.RAW |
| Analysis Time... | 54.8 | min | Equil Time... | 3 | Operator... | BEM |
| Outgas Time..... | 24.0 | hrs | Outgas Temp.. | 250 °C | Station #.. | 1 |

End of Run..... Wed Nov 17 13:12:43

### MULTI-POINT BET

| P/Po | Volume cc/g STP | 1/[W((Po/P)-1)] |
|---|---|---|
| 0.05320 | 0.0410 | 1.095E+03 |
| 0.10790 | 0.0466 | 2.075E+03 |
| 0.15930 | 0.0504 | 3.005E+03 |
| 0.20830 | 0.0534 | 3.946E+03 |

Area = 1.888E-01 $m^2/g$

Slope = 1.834E+04

Y - Intercept = 1.057E+02

Correlation Coefficient = 0.9999

C = 1.745E+02

# Quantachrome Corporation
## Quantachrome Autosorb Automated Gas Adsorption System Report
## 6 ANYGAS Version 2.30

Sample ID..... SWRI-D
Sample Description.....
Comments..... Southwest Research Institute
Gas Type..... Nitrogen

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Cross-Sec Area.. | 16.2 | Å² | Corr Factor.. | 6.580E-05 | Molec Wgt.. | 28.0134 |
| Sample Weight... | 4.9324 | g | P/Po Toler... | 2 | File Name.. | A53B1704.RAW |
| Analysis Time... | 54.5 | min | Equil Time... | 3 | Operator... | BEM |
| Outgas Time..... | 24.0 | hrs | Outgas Temp.. | 250 °C | Station #.. | 1 |

End of Run..... Wed Nov 17 13:13:15

### MULTI-POINT BET

| P/Po | Volume cc/g STP | 1/[W((Po/P)-1)] |
|---|---|---|
| 0.05570 | 0.0229 | 2.062E+03 |
| 0.10830 | 0.0251 | 3.864E+03 |
| 0.15850 | 0.0264 | 5.707E+03 |

Area = 9.804E-02 m²/g

Slope = 3.545E+04

Y - Intercept = 6.642E+01

Correlation Coefficient = 0.9998

C = 5.347E+02

**Quantachrome Corporation**
**Quantachrome Autosorb Automated Gas Adsorption System Report**
**6 ANYGAS Version 2.30**

Sample ID..... SWRI-E
Sample Description.....
Comments..... Southwest Research Institute
Gas Type..... Nitrogen

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Cross-Sec Area.. | 16.2 | Å² | Corr Factor.. | 6.580E-05 | Molec Wgt.. | 28.0134 |
| Sample Weight... | 3.0305 | g | P/Po Toler... | 2 | File Name.. | AS3B2206.RAW |
| Analysis Time... | 75.3 | min | Equil Time... | 3 | Operator... | BEM |
| Outgas Time..... | 48.0 | hrs | Outgas Temp.. | 250 °C | Station #.. | 1 |

End of Run..... 11-22-93 03:07am

**MULTI-POINT BET**

| P/Po | Volume cc/g STP | 1/[W((Po/P)-1)] |
|---|---|---|
| 0.10000 | 2.6213 | 3.391E+01 |
| 0.15210 | 2.8358 | 5.061E+01 |
| 0.19750 | 2.9998 | 6.564E+01 |
| 0.25580 | 3.2034 | 8.585E+01 |

Area = 1.044E+01 m²/g

Slope = 3.333E+02

Y - Intercept = 2.195E-01

Correlation Coefficient = 0.9998

C = 1.520E+03

# Quantachrome Corporation
## Quantachrome Autosorb Automated Gas Adsorption System Report
## 6 ANYGAS Version 2.30

Sample ID..... SWRI-F
Sample Description.....
Comments..... Southwest Research Institute
Gas Type..... Nitrogen

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Cross-Sec Area.. | 16.2 | Å² | Corr Factor.. | 6.580E-05 | Molec Wgt.. | 28.0134 |
| Sample Weight... | 3.8105 | g | P/Po Toler... | 2 | File Name.. | AS3B1504.RAW |
| Analysis Time... | 55.0 | min | Equil Time... | 3 | Operator... | BEM |
| Outgas Time..... | 48.0 | hrs | Outgas Temp.. | 250 °C | Station #.. | 1 |

End of Run..... 11-15-93 13:37pm

### MULTI-POINT BET

| P/Po | Volume cc/g STP | 1/[W((Po/P)-1)] |
|---|---|---|
| 0.05670 | 0.0234 | 2.059E+03 |
| 0.10850 | 0.0277 | 3.518E+03 |
| 0.15850 | 0.0299 | 5.034E+03 |
| 0.20800 | 0.0321 | 6.543E+03 |

Area = 1.159E-01 m²/g

Slope = 2.970E+04

Y - Intercept = 3.405E+02

Correlation Coefficient = 0.9998

C = 8.823E+01

# Quantachrome Corporation
## Quantachrome Autosorb Automated Gas Adsorption System Report
## 6 ANYGAS Version 2.30

Sample ID..... SWRI-G
Sample Description.....
Comments..... Southwest Research Institute
Gas Type..... Nitrogen

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Cross-Sec Area.. | 16.2 | Å² | Corr Factor.. | 6.580E-05 | Molec Wgt.. | 28.0134 |
| Sample Weight... | 5.0051 | g | P/Po Toler... | 2 | File Name.. | AS3B1103.RAW |
| Analysis Time... | 273.2 | min | Equil Time... | 3 | Operator... | BEM |
| Outgas Time..... | 24.0 | hrs | Outgas Temp.. | 250 °C | Station #.. | 1 |

End of Run..... 11-11-93 04:36pm

### MULTI-POINT BET

| P/Po | Volume cc/g STP | 1/[W((Po/P)-1)] |
|---|---|---|
| 0.05510 | 0.0277 | 1.687E+03 |
| 0.10860 | 0.0322 | 3.031E+03 |
| 0.15790 | 0.0349 | 4.301E+03 |
| 0.20810 | 0.0370 | 5.690E+03 |

Area = 1.322E-01 m²/g

Slope = 2.612E+04

Y - Intercept = 2.187E+02

Correlation Coefficient = 0.9997

C = 1.204E+02

**Quantachrome Corporation**
**Quantachrome Autosorb Automated Gas Adsorption System Report**
**6 ANYGAS Version 2.30**

Sample ID..... SWRI-H
Sample Description.....
Comments..... Southewest Research Institute
Gas Type..... Nitrogen

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Cross-Sec Area.. | 16.2 | Å² | Corr Factor.. | 6.580E-05 | Molec Wgt.. | 28.0134 |
| Sample Weight... | 3.8105 | g | P/Po Toler... | 2 | File Name.. | A63B1704.RAW |
| Analysis Time... | 57.5 | min | Equil Time... | 3 | Operator... | BEM |
| Outgas Time..... | 24.0 | hrs | Outgas Temp.. | 250 °C | Station #.. | 1 |

End of Run..... Wed Nov 17 13:13:33

**MULTI-POINT BET**

| P/Po | Volume cc/g STP | 1/[W((Po/P)-1)] |
|---|---|---|
| 0.10530 | 0.3859 | 2.440E+02 |
| 0.15610 | 0.4247 | 3.484E+02 |
| 0.20640 | 0.4579 | 4.544E+02 |
| 0.25650 | 0.4882 | 5.654E+02 |

Area = 1.626E+00 m²/g

Slope = 2.123E+03

Y - Intercept = 1.858E+01

Correlation Coefficient = 0.9999

C = 1.153E+02

# Quantachrome Corporation
## Quantachrome Autosorb Automated Gas Adsorption System Report
## 6 ANYGAS Version 2.30

Sample ID..... SWRI-I
Sample Description.....
Comments..... Southwest Research Institute
Gas Type..... Nitrogen

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Cross-Sec Area.. | 16.2 | Å² | Corr Factor.. | 6.580E-05 | Molec Wgt.. | 28.0134 |
| Sample Weight... | 1.2818 | g | P/Po Toler... | 2 | File Name.. | AS3B2301.RAW |
| Analysis Time... | 55.0 | min | Equil Time... | 3 | Operator... | BEM |
| Outgas Time..... | 36.0 | hrs | Outgas Temp.. | 250 °C | Station #.. | 1 |

End of Run..... 11-23-93 01:42pm

### MULTI-POINT BET

| P/Po | Volume cc/g STP | 1/[W((Po/P)-1)] |
|---|---|---|
| 0.10720 | 0.4945 | 1.943E+02 |
| 0.15700 | 0.5535 | 2.692E+02 |
| 0.20690 | 0.5956 | 3.505E+02 |
| 0.25610 | 0.6441 | 4.276E+02 |

Area = 2.180E+00 m²/g

Slope = 1.573E+03

Y - Intercept = 2.437E+01

Correlation Coefficient = 0.9999

C = 6.557E+01

**Quantachrome Corporation**
**Quantachrome Autosorb Automated Gas Adsorption System Report**
**6 ANYGAS Version 2.30**

Sample ID..... SWRI-J
Sample Description.....
Comments..... Southwest Research Institute
Gas Type..... Nitrogen

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Cross-Sec Area.. | 16.2 | Å² | Corr Factor.. | 6.580E-05 | Molec Wgt.. | 28.0134 |
| Sample Weight... | 1.2016 | g | P/Po Toler... | 2 | File Name.. | AS3B2204.RAW |
| Analysis Time... | 45.5 | min | Equil Time... | 3 | Operator... | BEM |
| Outgas Time..... | 36.0 | hrs | Outgas Temp.. | 250 °C | Station #.. | 1 |

End of Run.....

**MULTI-POINT BET**

| P/Po | Volume cc/g STP | 1/[W((Po/P)-1)] |
|---|---|---|
| 0.05660 | 0.0542 | 8.857E+02 |
| 0.10830 | 0.0645 | 1.506E+03 |
| 0.15840 | 0.0710 | 2.120E+03 |
| 0.20840 | 0.0754 | 2.793E+03 |

Area = 2.744E-01 m²/g

Slope = 1.253E+04

Y - Intercept = 1.606E+02

Correlation Coefficient = 0.9996

C = 7.902E+01