

## LAMPIRAN 1

### Hasil Pengujian Luas Permukaan Karbon Aktif dari Variasi KOH/Arang Tempurung Kelapa (3/1) pada Tempertur 700 °C

#### SURFACE AREA METER SORPTOMATIC 1800 CARLO ERBA BET SURFACE AREA ANALYSIS

Report Date : 19 Juni 2010	Temperature : 25,2 °C
Sample ID : KOH / ATK (3/1) pd 700 C	Adsorbate : Nitrogen
User : -	Sample Weight : 0,3703 gr
Operator : Mujinem	Po : 685 mmHg
P Operation : 760 mmHg	Pe : 846 mmHg

#### EXPERIMENTAL DATA

No	Pa	Vi	Vg	Va	Va/g	P / Po (x)
1.	9,4247	17,4335	4,1265	13,307	35,9261	0,0138
2.	40,6755	34,8671	14,036	20,8311	56,2394	0,0594
3.	85,2931	52,3006	28,184	24,1166	65,1097	0,1245
4.	134,3291	69,7342	43,7331	26,0011	70,1973	0,1961
5.	181,6389	87,1677	58,7348	28,4329	76,7627	0,2652
6.	259,7975	104,6012	83,5185	21,0828	56,9189	0,3793
7.						
8.						
9.						
10.						
11.						
12.						

No	Pa	Va/g	Po - Pa	$Y = P / \{ Va ( Po - P ) . g \}$	P / Po (x)
1.	40,6755	56,2394	644,3245	0,0011	0,0594
2.	85,2931	65,1097	599,7069	0,0022	0,1245
3.	134,3291	70,1973	550,6709	0,0035	0,1961
4.	181,6389	76,7627	503,3611	0,0047	0,2652
5.					
6.					

Slope ( m ) : 0,0175  
 Intersept ( b ) : 0,000054  
 Vm : 56,7947 cm<sup>3</sup> / gr  
 Correlation Coefficient : 0,998  
 BET Surface Area : 91,5524 m<sup>2</sup>  
 BET Spesific Surface Area ( SS ) : 247,2385 m<sup>2</sup> / gr

## LAMPIRAN 2

### Hasil Pengujian Luas Permukaan Karbon Aktif dari Variasi KOH/Arang Tempurung Kelapa (3/1) pada Tempertur 800 °C

#### SURFACE AREA METER SORPTOMATIC 1800 CARLO ERBA BET SURFACE AREA ANALYSIS

Report Date	: 19 Juni 2010	Temperature	: 25,2 °C
Sample ID	: KOH / ATK (3/1) pd 800 C	Adsorbate	: Nitrogen
User	: -	Sample Weight	: 0,5143 gr
Operator	: Mujinem	Po	: 697 mmHg
P Operation	: 760 mmHg	Pe	: 846 mmHg

#### EXPERIMENTAL DATA

No	Pa	Vi	Vg	Va	Va/g	P / Po (x)
1.	34,9234	17,4335	11,7851	5,6484	10,9828	0,5143
2.	94,4040	34,8671	26,7888	8,0783	15,7073	0,1354
3.	155,2872	52,3006	42,1462	10,1544	19,7442	0,2228
4.	247,8960	69,7342	65,5063	4,2279	8,2206	0,3557
5.	301,5316	87,1677	79,0357	8,1320	15,8118	0,4326
6.	345,0511	104,6012	90,0132	14,5881	28,3649	0,4951
7.	402,5706	122,0348	104,5222	17,5126	34,0513	0,5776
8.						
9.						
10.						
11.						
12.						

No	Pa	Va/g	Po - Pa	$Y = P / \{Va (Po - P).g\}$	P / Po (x)
1.	34,9234	10,9828	662,0766	0,0048	0,0501
2.	94,404	15,7073	602,5960	0,0100	0,1354
3.	155,2872	19,7442	541,7128	0,0145	0,2228
4.					
5.					
6.					

Slope ( m ) : 0,0561  
 Intersept ( b ) : 0,0021  
 Vm : 17,1607 cm<sup>3</sup> / gr  
 Correlation Coefficient : 0,9990  
 BET Surface Area : 38,4203 m<sup>2</sup>  
 BET Spesific Surface Area ( SS ) : 74,7041 m<sup>2</sup> / gr

### LAMPIRAN 3

## Hasil Pengujian Luas Permukaan Karbon Aktif dari Variasi KOH/Arang Tempurung Kelapa (3/1) pada Tempertur 900 °C

#### SURFACE AREA METER SORPTOMATIC 1800 CARLO ERBA BET SURFACE AREA ANALYSIS

Report Date	: 19 Juni 2010	Temperature	: 25,2 °C
Sample ID	: KOH / ATK (3/1) pd 900 C	Adsorbate	: Nitrogen
User	: -	Sample Weight	: 0,2983 gr
Operator	: Mujinem	Po	: 697 mmHg
P Operation	: 760 mmHg	Pe	: 850 mmHg

#### EXPERIMENTAL DATA

No	Pa	Vi	Vg	Va	Va/g	P / Po (x)
1.	24,4690	17,5160	9,1913	8,3247	27,9070	0,0351
2.	107,8937	35,0319	30,3343	4,6976	15,7480	0,1548
3.	180,5308	52,5479	48,7432	3,8047	12,7546	0,2590
4.	285,2763	70,0639	75,2897	-5,2258	-17,5187	0,4093
5.	343,3347	87,5798	90,0038	-2,4239	-8,1259	0,4926
6.						
7.						
8.						
9.						
10.						
11.						
12.						

No	Pa	Va/g	Po - Pa	$Y = P / \{Va (Po - P) . g\}$	P / Po (x)
1.	107,8937	15,7480	589,1063	0,0166	0,1548
2.	180,5308	12,7546	516,4692	0,0274	0,2590
3.					
4.					
5.					
6.					

Slope ( m ) : 0,1516  
 Intersept ( b ) : - 0,0119  
 Vm : 7,1552 cm<sup>3</sup> / gr  
 Correlation Coefficient : 0,9999  
 BET Surface Area : 9,2914 m<sup>2</sup>  
 BET Spesific Surface Area ( SS ) : 31,1479 m<sup>2</sup> / gr

## LAMPIRAN 4

### Hasil Pengujian Luas Permukaan Karbon Aktif dari Variasi KOH/Arang Tempurung Kelapa (4/1) pada Tempertur 700 °C

Gemini 2360 V4.01

Instrument ID:

Setup Group: 5 - 5

Sample ID: 030-005-01

Date: 16/11/09 Time: 15:42

Sample Weight: 0.1294 g

Saturation Pressure: 762.55 mmHg

Measured Free Space: 0.534 cc STP

Evacuation Time: 1.0 min

Analysis Mode: Equilibration

Equilibration Time: 1 sec

#### BET Multipoint Surface Area Report

Surface Area: 684.3586 sq. m/g

Slope: 0.006569

Y-Intercept: -0.000208

C: -30.591818

Vm: 157.208221

Correlation Coefficient: 9.9748e-001

#### Langmuir Surface Area Report

Surface Area: 1055.7866 sq. m/g

Slope: 0.004123

Y-Intercept: 0.000027

b: 0.006598

Vm: 242.531219

Correlation Coefficient: 9.9999e-001

#### Analysis Log

Relative Pressure	Pressure (mmHg)	Vol. Adsorbed (cc/g STP)	Surface Area Point
0.0999	76.14	228.183	*
0.1500	114.39	232.142	*
0.1999	152.43	234.380	*
0.2499	190.55	236.090	*

## LAMPIRAN 5

### Hasil Pengujian Luas Permukaan Karbon Aktif dari Variasi KOH/Arang Tempurung Kelapa (4/1) pada Tempertur 800 °C

Gemini 2360 V4.01

Instrument ID:

Setup Group: 5 - 5

Sample ID: 030-006-1

Date: 17/11/09 Time: 09:46

Sample Weight: 0.1601 g

Saturation Pressure: 762.55 mmHg

Measured Free Space: 0.448 cc STP

Evacuation Time: 1.0 min

Analysis Mode: Equilibration

Equilibration Time: 1 sec

#### BET Multipoint Surface Area Report

Surface Area: 492.1876 sq. m/g

Slope: 0.009052

Y-Intercept: -0.000207

C: -42.627975

Vm: 113.063423

Correlation Coefficient: 9.9880e-001

#### Langmuir Surface Area Report

Surface Area: 717.8841 sq. m/g

Slope: 0.006064

Y-Intercept: 0.000046

b: 0.007619

Vm: 164.909546

Correlation Coefficient: 9.9998e-001

#### Analysis Log

Relative Pressure	Pressure (mmHg)	Vol. Adsorbed (cc/g STP)	Surface Area Point
0.1000	76.49	153.775	*
0.1499	114.33	156.602	*
0.1999	152.46	158.555	*
0.2500	190.97	160.272	*
0.3001	228.82	161.671	*

## LAMPIRAN 6

### Hasil Pengujian Luas Permukaan Karbon Aktif dari Variasi KOH/Arang Tempurung Kelapa (4/1) pada Tempertur 900 °C

Gemini 2360 V4.01

Instrument ID:

Setup Group: 5 - 5

Sample ID: 030-007-1      Date: 17/11/09      Time: 10:36  
Sample Weight: 0.1387 g      Saturation Pressure: 762.55 mmHg  
Measured Free Space: 0.380 cc STP      Evacuation Time: 1.0 min  
Analysis Mode: Equilibration      Equilibration Time: 1 sec

#### BET Multipoint Surface Area Report

Surface Area: 457.6505 sq. m/g  
Slope: 0.009715  
Y-Intercept: -0.000203  
C: -46.923435  
Vm: 105.129707  
Correlation Coefficient: 9.9882e-001

#### Langmuir Surface Area Report

Surface Area: 670.5977 sq. m/g  
Slope: 0.006492  
Y-Intercept: 0.000069  
b: 0.010601  
Vm: 154.047089  
Correlation Coefficient: 9.9997e-001

#### Analysis Log

Relative Pressure	Pressure (mmHg)	Vol. Adsorbed (cc/g STP)	Surface Area Point
0.1000	76.22	139.845	*
0.1505	114.74	143.484	*
0.2000	152.50	146.018	*
0.2505	191.03	148.033	*
0.3001	228.82	149.896	*

## LAMPIRAN 7

### Hasil Pengujian Luas Permukaan Karbon Aktif dari Variasi KOH/Batu Bara (3/1) pada Tempertur 700 °C

#### SURFACE AREA METER SORPTOMATIC 1800 CARLO ERBA BET SURFACE AREA ANALYSIS

Report Date	: 19 Juni 2010	Temperature	: 25,2 °C
Sample ID	: KOH / BB (3/1) pd 700 C	Adsorbate	: Nitrogen
User	: -	Sample Weight	: 0,4451 gr
Operator	: Mujinem	Po	: 697 mmHg
P Operation	: 760 mmHg	Pe	: 846 mmHg

#### EXPERIMENTAL DATA

No	Pa	Vi	Vg	Va	Va/g	P / Po (x)
1.	20,5988	17,4335	8,1718	9,2617	20,8082	0,0296
2.	71,1329	34,8671	20,9187	13,9484	31,3376	0,1021
3.	134,9246	52,3006	37,0099	15,2907	34,3535	0,1936
4.	228,9557	69,7342	60,7287	9,0055	20,2325	0,3285
5.	295,9868	87,1677	77,637	9,5307	21,4125	0,4247
6.	344,0639	104,6012	89,7642	14,8371	33,3342	0,4936
7.	409,4258	122,0348	106,2514	15,7834	35,4603	0,5874
8.						
9.						
10.						
11.						
12.						

No	Pa	Va/g	Po - Pa	$Y = P / \{Va (Po - P).g\}$	P / Po (x)
1.	71,1329	31,3376	625,8671	0,0036	0,1021
2.	134,9246	34,3535	562,0754	0,0070	0,1936
3.					
4.					
5.					
6.					

Slope ( m ) : 0,0372  
 Intersept ( b ) : -0,0002  
 Vm : 27,0529 cm<sup>3</sup> / gr  
 Correlation Coefficient : 0,9999  
 BET Surface Area : 52,4180 m<sup>2</sup>  
 BET Spesific Surface Area ( SS ) : 117,7667 m<sup>2</sup> / gr



## LAMPIRAN 8

### Hasil Pengujian Luas Permukaan Karbon Aktif dari Variasi KOH/Batu Bara (3/1) pada Tempertur 800 °C

#### SURFACE AREA METER SORPTOMATIC 1800 CARLO ERBA BET SURFACE AREA ANALYSIS

Report Date : 19 Juni 2010	Temperature : 25,2 °C
Sample ID : KOH / BB (3/1) pd 800 C	Adsorbate : Nitrogen
User : -	Sample Weight : 0,2294 gr
Operator : Mujinem	Po : 685 mmHg
P Operation : 760 mmHg	Pe : 846 mmHg

#### EXPERIMENTAL DATA

No	Pa	Vi	Vg	Va	Va/g	P / Po (x)
1.	6,7817	17,4335	3,2884	14,1451	61,6615	0,0099
2.	16,5100	34,8671	6,3732	28,4939	124,2105	0,0241
3.	46,9667	52,3006	16,0309	36,2697	158,1069	0,0686
4.	86,6267	69,7342	28,6069	41,1273	179,2819	0,1265
5.	134,7500	87,1677	43,8666	43,3011	188,7581	0,1967
6.	205,7617	104,6012	66,3840	38,2173	166,5966	0,3004
7.	267,5083	122,0348	85,9635	36,0713	157,2419	0,3905
8.						
9.						
10.						
11.						
12.						

No	Pa	Va/g	Po - Pa	$Y = P / \{Va (Po - P).g \}$	P / Po (x)
1.	46,9667	158,1069	638,0333	0,0005	0,0686
2.	86,6267	179,2819	598,3733	0,0008	0,1265
3.	134,7500	188,7581	550,2500	0,0013	0,1967
4.	205,7617	166,5966	479,2383	0,0026	0,3004
5.					
6.					

Slope ( m ) : 0,0091  
 Intersept ( b ) : -0,0003  
 Vm : 113,0565 cm<sup>3</sup> / gr  
 Correlation Coefficient : 0,9845  
 BET Surface Area : 112,9009 m<sup>2</sup>  
 BET Spesific Surface Area ( SS ) : 492,1574 m<sup>2</sup> / gr



## LAMPIRAN 9

### Hasil Pengujian Luas Permukaan Karbon Aktif dari Variasi KOH/Batu Bara (3/1) pada Tempertur 900 °C

#### SURFACE AREA METER SORPTOMATIC 1800 CARLO ERBA BET SURFACE AREA ANALYSIS

Report Date	: 19 Juni 2010	Temperature	: 25,2 °C
Sample ID	: KOH / BB (3/1) pd 900 C	Adsorbate	: Nitrogen
User	: -	Sample Weight	: 0,2712 gr
Operator	: Mujinem	Po	: 685 mmHg
P Operation	: 760 mmHg	Pe	: 846 mmHg

#### EXPERIMENTAL DATA

No	Pa	Vi	Vg	Va	Va/g	P / Po (x)
1.	4,1974	17,4335	2,4690	14,9645	55,1790	0,0061
2.	5,0556	34,8671	2,7411	32,1260	118,4586	0,0074
3.	17,0987	52,3006	6,5599	45,7407	168,6605	0,0250
4.	61,854	69,7342	20,7516	48,9826	180,6142	0,0903
5.	112,6993	87,1677	36,8744	50,2933	185,4473	0,1645
6.	166,0799	104,6012	53,8011	50,8002	187,3162	0,2425
7.	246,8618	122,0348	79,4166	42,6182	157,1467	0,3604
8.	296,5055	139,4683	95,1584	44,3099	163,3847	0,4329
9.						
10.						
11.						
12.						

No	Pa	Va/g	Po - Pa	$Y = P / \{Va (Po - P).g\}$	P / Po (x)
1.	61,8540	180,6142	623,1460	0,0005	0,0903
2.	112,6993	185,4473	572,3007	0,0011	0,1645
3.	166,0799	187,3162	518,9201	0,0017	0,2425
4.					
5.					
6.					

Slope ( m ) : 0,0079  
 Intersept ( b ) : -0,000207  
 Vm : 130,2757 cm<sup>3</sup> / gr  
 Correlation Coefficient : 0,9986  
 BET Surface Area : 153,8019 m<sup>2</sup>  
 BET Spesific Surface Area ( SS ) : 567,1160 m<sup>2</sup> / gr

## LAMPIRAN 10

### Hasil Pengujian Luas Permukaan Karbon Aktif dari Variasi KOH/Batu Bara (4/1) pada Tempertur 700 °C

Gemini 2360 V4.01

Instrument ID:

Setup Group: 5 - 5

Sample ID: 030-002-1                      Date: 17/11/09    Time: 15:22  
Sample Weight:    0.1889 g                      Saturation Pressure: 762.55 mmHg  
Measured Free Space:    0.456 cc STP                      Evacuation Time:    1.0 min  
Analysis Mode: Equilibration                      Equilibration Time:    1 sec

#### BET Multipoint Surface Area Report

Surface Area:                      631.7073    sq. m/g  
Slope:                                      0.007050  
Y-Intercept:                              -0.000159  
C:    -43.285156  
Vm:    145.113373  
Correlation Coefficient: 9.9838e-001

#### Langmuir Surface Area Report

Surface Area:                      996.7950    sq. m/g  
Slope:                                      0.004367  
Y-Intercept:                              0.000092  
b:    0.021074  
Vm:    228.979904  
Correlation Coefficient: 9.9975e-001

#### Analysis Log

Relative Pressure	Pressure (mmHg)	Vol. Adsorbed (cc/g STP)	Surface Area Point
0.1000	76.25	192.300	*
0.1499	114.32	199.375	*
0.2002	152.63	205.471	*
0.2500	190.65	210.559	*
0.2998	228.65	215.158	*

## LAMPIRAN 11

### Hasil Pengujian Luas Permukaan Karbon Aktif dari Variasi KOH/Batu Bara (4/1) pada Tempertur 800 °C

Gemini 2360 V4.01

Instrument ID:

Setup Group: 5 - 5

Sample ID: 030-003-1                      Date: 16/11/09    Time: 14:49  
Sample Weight: 0.1930 g                      Saturation Pressure: 762.55 mmHg  
Measured Free Space: 3.100 cc STP                      Evacuation Time: 1.0 min  
Analysis Mode: Equilibration                      Equilibration Time: 1 sec

#### BET Multipoint Surface Area Report

Surface Area: 850.7216 sq. m/g  
Slope: 0.005231  
Y-Intercept: -0.000114  
C: -44.984520  
Vm: 195.424484  
Correlation Coefficient: 9.9870e-001

#### Langmuir Surface Area Report

Surface Area: 1242.1141 sq. m/g  
Slope: 0.003505  
Y-Intercept: 0.000032  
b: 0.009036  
Vm: 285.333649  
Correlation Coefficient: 9.9999e-001

#### Analysis Log

Relative Pressure	Pressure (mmHg)	Vol. Adsorbed (cc/g STP)	Surface Area Point
0.0997	76.05	262.168	*
0.1501	114.49	268.758	*
0.2002	152.70	272.721	*
0.2498	190.49	275.614	*
0.3000	228.70	278.032	*

## LAMPIRAN 12

### Hasil Pengujian Luas Permukaan Karbon Aktif dari Variasi KOH/Batu Bara (4/1) pada Tempertur 900 °C



## LAMPIRAN 13

### Hasil Pengujian Diameter Pori-Pori Pada Karbon Aktif

Date: 04/30/2010

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Quantachrome Corporation  
Quantachrome Autosorb Automated Gas Sorption System Report  
Autosorb for Windows® for AS-3 and AS-6 Version 1.23

Sample ID	2				
Description	800oC				
Comments					
Sample Weight	0.3299 g				
Adsorbate	NITROGEN	Outgas Temp	200.0 °C	Operator	jajat
Cross-Sec Area	16.2 Å <sup>2</sup> /molecule	Outgas Time	24.0 hrs	Analysis Time	109.3 min
NonIdeality	6.580E-05	P/Po Toler	3	End of Run	11/12/2009 12:31
Molecular Wt	28.0134 g/mol	Equil Time	2	File Name	AS961006.RAW
Station #	6	Bath Temp.	77.40	PC SW Version	1.23

#### AREA-VOLUME-PORE SIZE SUMMARY

#### SURFACE AREA DATA

Multipoint BET.....	5.984E+02	m <sup>2</sup> /g
Lanmuir Surface Area.....	8.868E+02	m <sup>2</sup> /g
t-Method External Surface Area.....	2.551E+02	m <sup>2</sup> /g
t-Method Micro Pore Surface Area.....	3.433E+02	m <sup>2</sup> /g
DR Method Micro Pore Area.....	8.523E+02	m <sup>2</sup> /g

#### PORE VOLUME DATA

t-Method Micro Pore Volume.....	1.786E-01	cc/g
DR Method Micro Pore Volume.....	3.029E-01	cc/g
HK Method Cumulative Pore Volume.....	2.839E-01	cc/g
SF Method Cumulative Pore Volume.....	2.863E-01	cc/g

#### PORE SIZE DATA

DR Method Micro Pore Width .....	6.684E+01	Å
DA Method Pore Diameter (Mode).....	1.680E+01	Å
HK Method Pore Width (Mode).....	1.362E+01	Å
SF Method Pore Diameter (Mode).....	2.565E+01	Å

#### DATA REDUCTION PARAMETERS

Thermal Transpiration : OFF  
Last Po Acquired 765.78 mm Hg  
Additional Initialization Information Not Recorded.

BJH/DH Moving Average Size : 1

Interaction Constant (K) 2.9600 nm<sup>3</sup> x kJ/mol