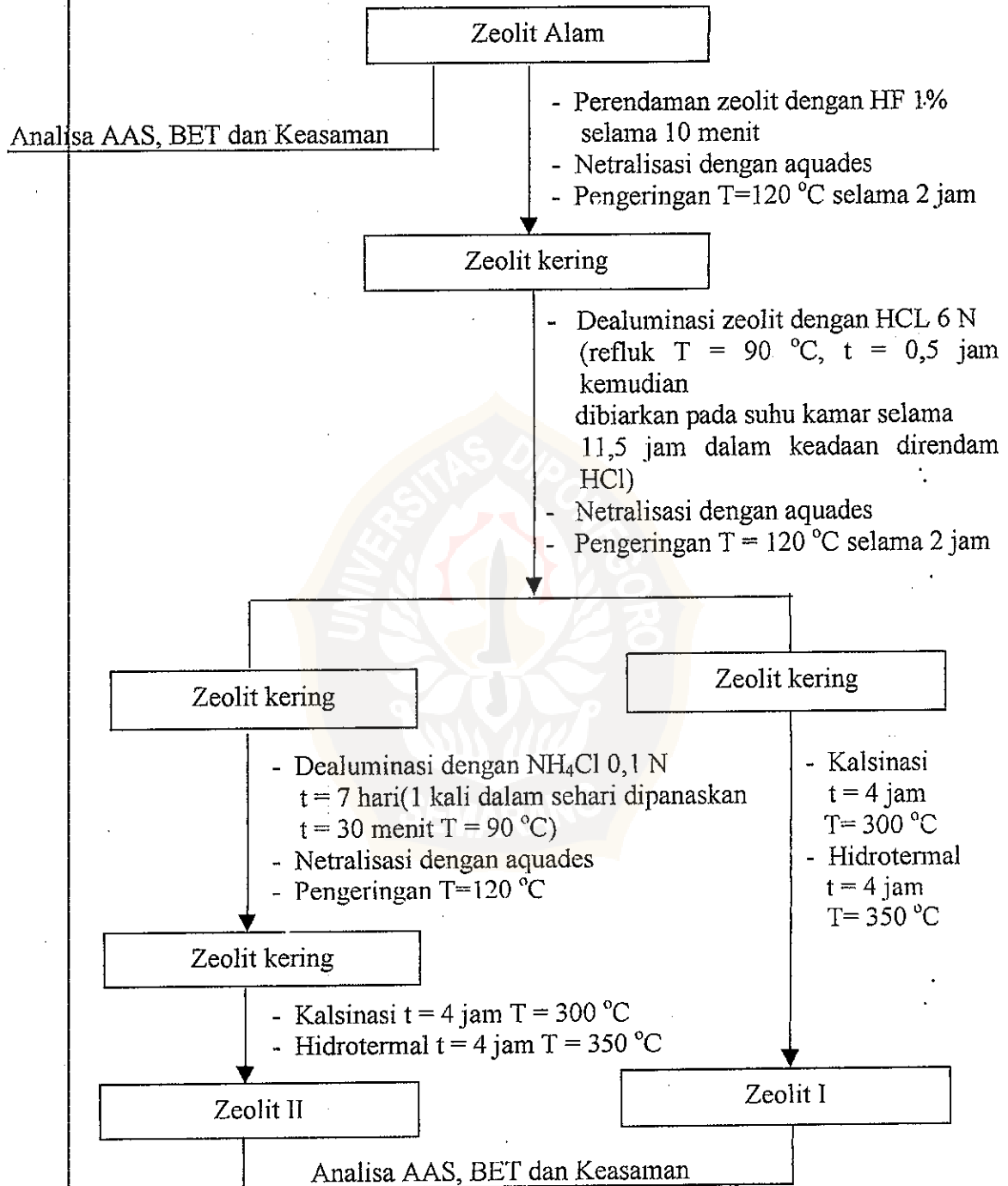


LAMPIRAN

Lampiran 1

DIAGRAM KERJA MODIFIKASI ZEOLIT ALAM CIPATUJAH



Lampiran 2

Perhitungan Jumlah Keasaman Zeolit

W_0 = Berat keramik

W_1 = Berat zeolit kering + berat keramik

W_2 = Berat zeolit kering + berat basa yang teradsorpsi oleh zeolit (NH_3) + berat keramik

$$\text{Keasaman zeolit} = \frac{W_2 - W_1}{(W_1 - W_0) \cdot Mr\text{NH}_3}$$

1. Keasaman zeolit alam

$$\text{Keasaman zeolit alam} = \frac{39,7809 - 39,7741}{(39,7741 - 39,2319) \cdot 17} = 0,74 \text{ mmol/gram}$$

2. Keasaman zeolit-I

$$\text{Keasaman zeolit-I} = \frac{32,2645 - 32,2304}{(32,2304 - 31,6941) \cdot 17} = 3,74 \text{ mmol/gram}$$

3. Keasaman zeolit-II

$$\text{Keasaman zeolit-II} = \frac{31,5665 - 31,5307}{(31,5307 - 31,0231) \cdot 17} = 4,15 \text{ mmol/gram}$$

Lampiran 3

Perhitungan Rasio Si/Al Zeolit

Berat Atom Si = 28,086 g/mol

Berat Atom Al = 27 g/mol

Metode = SNI 13-3608-1994

Sampel dalam keadaan kering (dipanaskan pada suhu 105 °C-110 °C)

3.1 Perhitungan Rasio Si/Al Zeolit Alam

Berat Si = 31,9 % Berat Al = 5,52 %

$$Si = \frac{31,9 \%}{28,086} = 1,1358 \%$$

$$Al = \frac{5,51 \%}{27} = 0,2041 \%$$

$$\frac{Si}{Al} = \frac{1,1358 \%}{0,2041 \%} = 5,565$$

3.2 Perhitungan Rasio Si/Al Zeolit-I

Berat Si = 32 % Berat Al = 4,9 %

$$Si = \frac{32 \%}{28,086} = 1,14 \%$$

$$Al = \frac{4,9 \%}{27} = 0,18 \%$$

$$\frac{Si}{Al} = \frac{1,14 \%}{0,18 \%} = 6,282$$

3.3 Perhitungan Rasio Si/Al zeolit-II

Berat Si = 36,8 % Berat Al = 4,58 %

$$Si = \frac{36,8 \%}{28,086} = 1,3103 \%$$

$$Al = \frac{4,58 \%}{27} = 0,16963 \%$$

$$\frac{Si}{Al} = \frac{1,31026 \%}{0,16963 \%} = 7,72446$$

Lampiran 4

Perhitungan Preparasi Bahan

4.1 Pembuatan Larutan HCL 6 N

Diketahui: ρ HCl = 1,19 kg/mL

Mr HCl = 36,46 g/mol

$$\% \frac{W}{W} = 37 \%$$

$$n_{eq} = \text{Jumlah } H^+ = 1$$

$$N_o = \% \frac{W}{W} \times \frac{\rho}{Mr} \times n_{eq}$$

$$N_o = \frac{37}{100} \times \frac{1,190,001 \text{ g/ml}}{36,46 \text{ g/mol}} \times 1 = 12,08 \text{ N}$$

$V_o N_o = V N$ dimana : V_o = Volume HCl awal

N_o = Normalitas HCL awal

V = Volume larutan HCl yang diinginkan

N = Normalitas larutan HCl yang diinginkan

Ditanyakan: Larutan HCl 6 N

Jawab:

Pembuatan larutan HCl 6 N:

$$V_o = \frac{6 \text{ N} \times 500 \text{ mL}}{12,08 \text{ N}} = 496,707 \text{ mL}$$

4.2 Pembuatan larutan NH_4Cl 0,1 N

Diketahui: Mr NH_4Cl = 53,49 g/mol

Diperlukan: 0,1 M dengan volume 500 ml

Jawab:

Mol NH_4Cl = $M \times V$ dimana: M = Molaritas NH_4Cl yang dibutuhkan

V = Volume NH_4Cl yang dibutuhkan

- Mol NH_4Cl yang dibutuhkan = $0,1 \text{ M} \times 0,5 \text{ L} = 0,05 \text{ mol}$
- Berat NH_4Cl yang dibutuhkan = $\text{mol} \times \text{Mr} = 0,05 \text{ mol} \times 53,49 \text{ g/mol}$
= 2,6745 g

4.3 Pembuatan Larutan H₂SO₄ 6 N

Diketahui: % H₂SO₄ = 96 % ρ H₂SO₄ = 1,84 g/mL

Mr H₂SO₄ = 98,066 g/mol

Ditanyakan: Larutan H₂SO₄ 6 N

Jawab:

$$N = \% \frac{W}{W} \times \frac{\rho}{Mr} \times n_{\text{eq}} \quad \text{dimana: } \rho = \text{Masa Jenis}$$

Mr = Berat Molekul

n_{eq} = Jumlah H⁺ = 2

$$N = \frac{96}{100} \frac{1,84 \times 0,001 \text{ g/L}}{98,066 \text{ g/mol}} \times 2 = 36,0247 \text{ N}$$

$$V_o N_o = V N \longrightarrow V_o 36,0247 \text{ N} = 6 \text{ N } 250 \text{ ml} \longrightarrow V_o = 41,638 \text{ ml}$$

4.4 Pembuatan Larutan NaOH 1 M

Diketahui: % NaOH = 48 %

ρ NaOH = 1,53 kg/L

Mr NaOH = 40 g/mol

Ditanyakan: Larutan NaOH 1 M

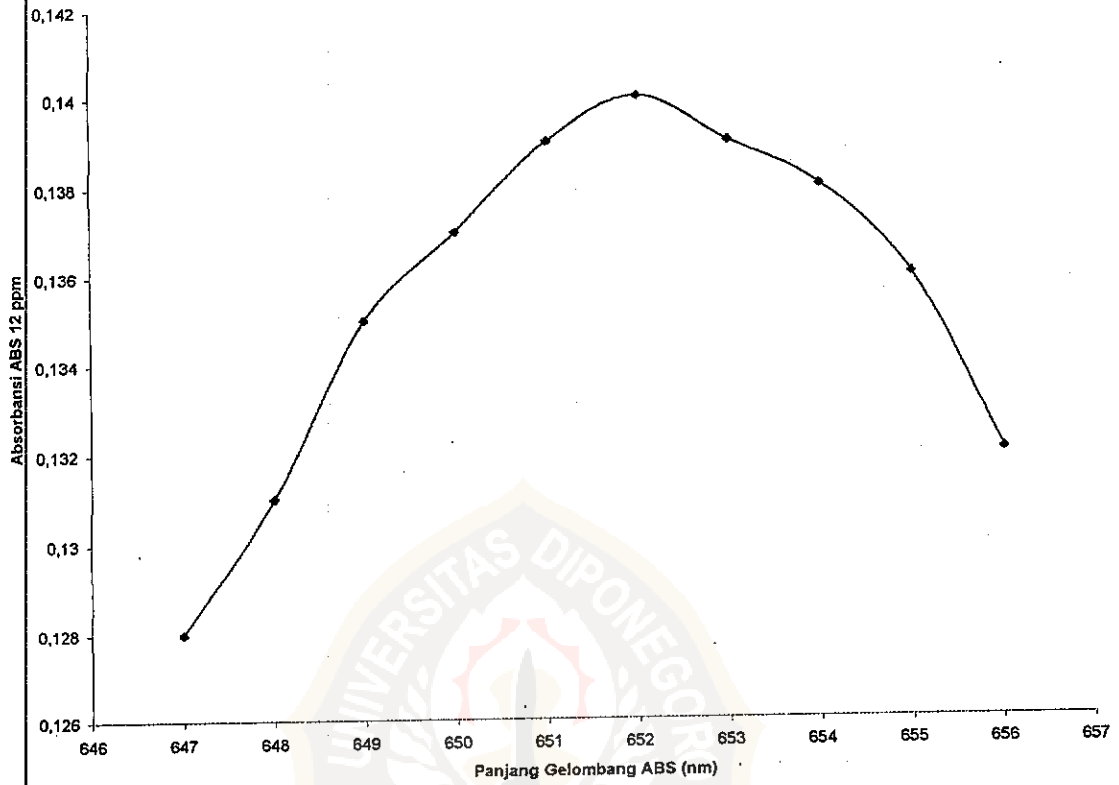
Jawab:

$$\text{Molaritas NaOH } 48 \% = \frac{48}{100} \frac{1,53 \times 0,001 \text{ g/L}}{40 \text{ g/mol}} = 18,36 \text{ M}$$

$$V_o M_o = V M \longrightarrow V_o 18,36 \text{ M} = 1 \text{ M } 100 \text{ ml} \longrightarrow V_o = 5,44 \text{ ml}$$

Lampiran 5

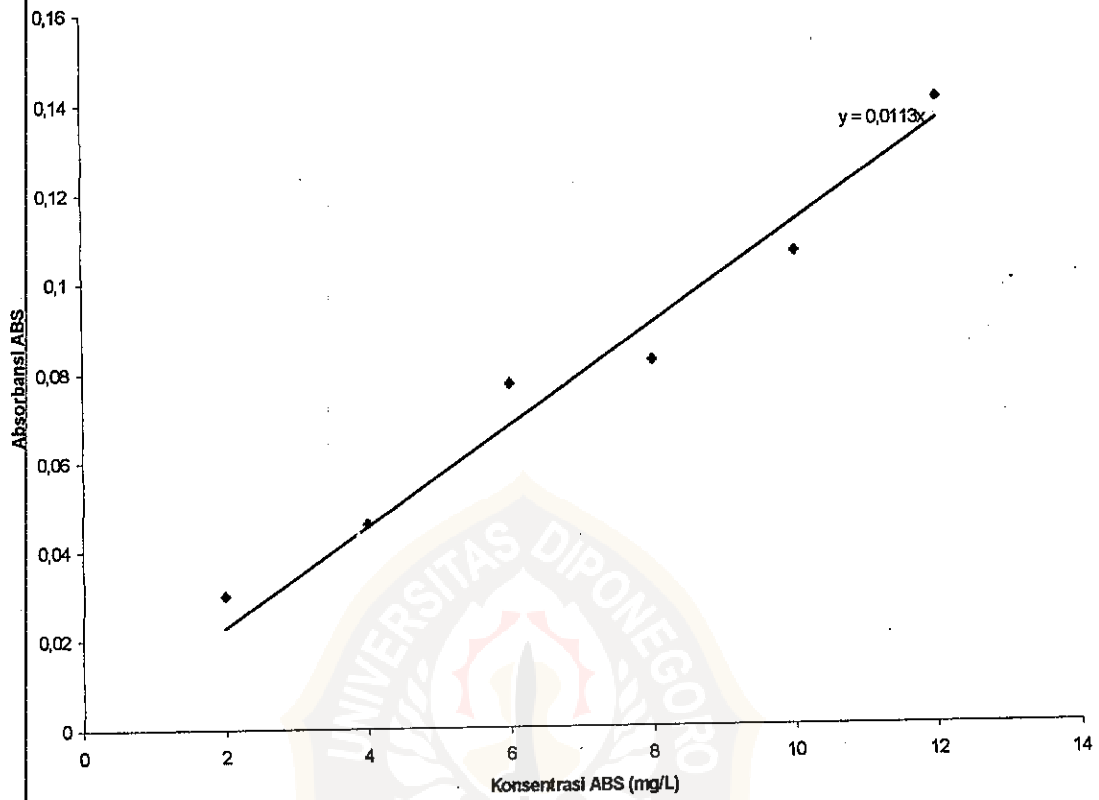
Kurva panjang gelombang maksimum ABS



Kurva panjang gelombang maksimum ABS pada konsentrasi 12 mg/L

Lampiran 6

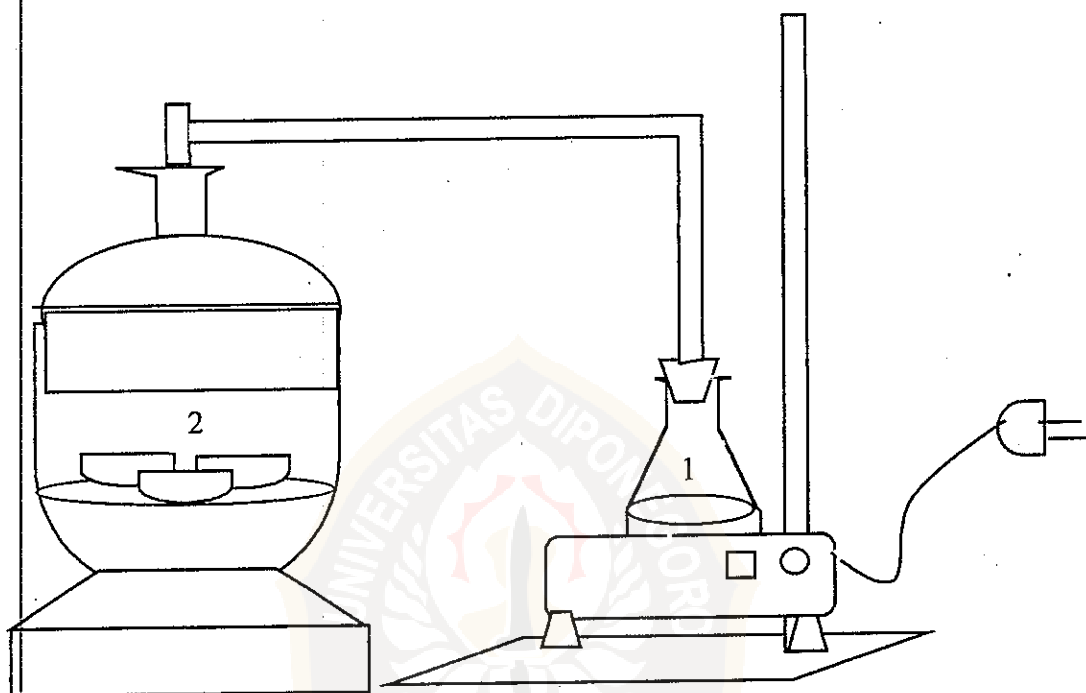
Kurva Kalibrasi ABS



Kurva Kalibrasi ABS

Lampiran 7

Gambar alat untuk uji kesaman zeolit



1. Amoniak
2. Zeolit alam, zeolit-I, zeolit-II



Form. No. : M-40004F0-PA

DEPARTEMEN ENERGI DAN SUMBER DAYA MINERAL REPUBLIK INDONESIA
BADAN PENELITIAN DAN PENGEMBANGAN ENERGI DAN SUMBER DAYA MINERAL
PUSAT PENELITIAN DAN PENGEMBANGAN TEKNOLOGI MINERAL DAN BATUBARA

Jalan Jenderal Sudirman No. 623 Bandung - 40211

e-mail : tekmin@pptm.dpe.go.id

Tromol Pos : 816

Telepon : (022) 6030483/6038024

Fax. : (022) 6003373

LABORATORIUM KIMIA MINERAL DAN LINGKUNGAN
CHEMICAL LABORATORY for MINERAL and ENVIRONMENT

Nomor : 120 /LKML/IV / 2003

SERTIFIKAT ANALISIS
(CERTIFICATE OF ANALYSIS)

Dibuat untuk
Certified for

: Sdr. Asmaul Khusna/Mahasiswa UNDIP Jurusan Kimia

Jenis contoh
Type of sample

: Zeolit

Asal contoh
Origin of sample

: Cipatujah

Jumlah Contoh
Amount of sample

: 7 Sampel

Nomor Laboratorium
Laboratory Number

: 320-326/2003

Contoh diterima
Sample received on

: 24-03-2003

Hasil analisis :
Analysis result

Hasil analisis kimia

Zeolit Alam

Nomor lab.	320/03	321/03	322/03	323/03	324/03	325/03	326/03	
Tanda	Z-A AH	Z-4	Z-5	Z-7	Z-C	Z-20	Z-60	METODE
Si	% 36,8	34,0	34,2	33,0	31,9	33,9	33,7	SNI 13-3608-1994
Al	% 3,65	5,64	4,79	5,90	5,51	5,64	5,51	SNI 13-3608-1994

Keterangan : Sampel diperiksa dari bahan kering (105-110°C)

Bandung, 03 April 2003
Manajer Teknis,



Mustar

Yang terhormat
Sdr. Asmaul Khusna
Mahasiswa UNDIP Jurusan Kimia
Jl. Banjarsari Selatan No. 7 Tembalang
Semarang 50275.

Catatan : 1. Hasil analisis ini hanya berlaku untuk contoh yang diuji
Notes *These analysis result are only valid for the tested samples*

2. Sertifikat ini tidak boleh diperbanyak (digandakan) tanpa izin dari laboratorium (Manajer Teknis)
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PUSAT PENELITIAN DAN PENGEMBANGAN TEKNOLOGI MINERAL DAN BATUBARA

Jalan Jenderal Sudirman No. 623 Bandung - 40211

e-mail : tekmin@pptm.dpe.go.id

Tromol Pos : 816

Telepon : (022) 6030483/6038024

Fax. : (022) 6003373

LABORATORIUM KIMIA MINERAL DAN LINGKUNGAN
CHEMICAL LABORATORY for MINERAL and ENVIRONMENT

Nomor : 95 /LKML//II / 2003

SERTIFIKAT ANALISIS
(CERTIFICATE OF ANALYSIS)

Dibuat untuk : Sdr. Asmaul Husna (QQ)/Mahasiswa UNDIP Jurusan Kimia-FMIPA.
Certified for

Jenis contoh : Serbuk Zeolit
Type of sample

Asal contoh : -
Origin of sample

Jumlah Contoh : 5 Sampel
Amount of sample

Nomor Laboratorium : 209-213/2003
Laboratory Number

Contoh diterima : 10-02-2003
Sample received on

Hasil analisis :
Analysis result

Hasil analisis kimia

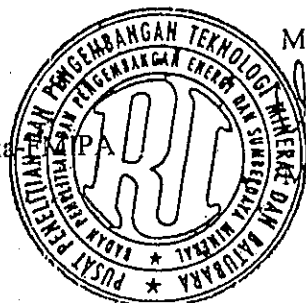
Zeolit I

Nomor lab.	209/2003	210/2003	211/2003	212/2003	213/2003	METODE
Tanda	F	G	H	I	O	
Si (%)	32,3	33,5	32,9	32,1	32,0	SNI 13-3608-1994
Al (%)	5,24	5,12	5,24	5,12	4,90	SNI 13-3608-1994

Keterangan : Sampel diperiksa dari bahan kering (105-110°C).

Bandung, 19 Februari 2003

Yang terhormat
Sdr. Asmaul Husna (QQ)
Mahasiswa UNDIP Jurusan Kimia
D/a. Jl. Banjarsari Selatan No. 7
Tembalang-Semarang 50275.



Manajer Teknis,

Justar

Catatan : 1. Hasil analisis ini hanya berlaku untuk contoh yang diuji

Notes *These analysis result are only valid for the tested samples*

2. Sertifikat ini tidak boleh diperbanyak (digandakan) tanpa izin dari laboratorium (Manajer Teknis)

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 Jalan Jenderal Sudirman 623 Bandung - 40211
 e-mail : tekmin@pptn.dpe.go.id Tromol Pos : 816 Telepon : (022) 6030483 Fax : (022) 6003373

LABORATORIUM KIMIA MINERAL DAN LINGKUNGAN
CHEMICAL LABORATORY for MINERAL and ENVIRONMENT

Nomor: 282 /LKML/IX / 2003

SERTIFIKAT ANALISIS
CERTIFICATE OF ANALYSIS

Dibuat untuk : Sdr. Asmaul Khusna/Mahasiswa UNDIP
 Certified for

Jenis contoh : Zeolit
 Tipe of sample

Asal contoh : Cipatujah
 Origin of sample

Jumlah Contoh : 1 sampel
 Amount of sample

Nomor Laboratorium : 1452/2003
 Laboratory Number

Contoh diterima : 20-08-2003
 Sample received on

Hasil analisis :
 Analysis result

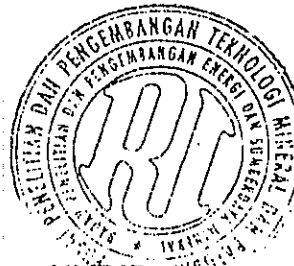


Hasil analisis kimia Zeolit II

Lab. No.	1539/2003	Metode
Tanda	II	
Si	% 36,8	SNI 13-3608-1994
Al	% 4,58	SNI 13-3608-1994

Keterangan : Sampel diperiksa dari bahan kering (105-110°C).

Bandung, 10 September 2003
 Manajer Teknis,



Mustar

Yang terhormat
 Sdr. Asmaul Khusna/Mahasiswa UNDIP
 Jl. Ngerep Timur V No. 100
 Tembalang-Semarang.

Catatan : 1. Hasil Analisis ini hanya berlaku untuk contoh yang diuji

Notes These analysis result are only valid for the tested samples

2. Sertifikat ini tidak boleh diperbanyak (digandakan) tanpa izin dari laboratorium (Manajer Teknis)

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Hasil Analisis Luas Permukaan Zeolit Alam

Quantachrome Corporation
NOVA Data Analysis Package Ver. 2.00
File Name = imron-20.dat

ID	= Imron	User Setup	= 5
Sample ID	= Zeolit 0	Sample Cell Number	= 2
Sample Weight	= 0.2768 g	Sample Volume	= 0.2768 cc
Sample Density	= 1.0000 g/cc		
Operator	= User	Po	= 750.23 mm Hg
Substrate	= N2	Bath Temperature	= 77.40 deg K
Adsorption Tolerance	= 0.1000 mm Hg	Desorption Tolerance	= 0.0000 mm Hg
Adsorption Equil Time	= 60 sec	Desorption Equil Time	= 0 sec
Adsorption Dwell Time	= 180 sec	Desorption Dwell Time	= 0 sec
Analysis Start Time	= Mon Dec 29 09:45:49 2003	Analysis End Time	= Mon Dec 29 11:30:41 2003

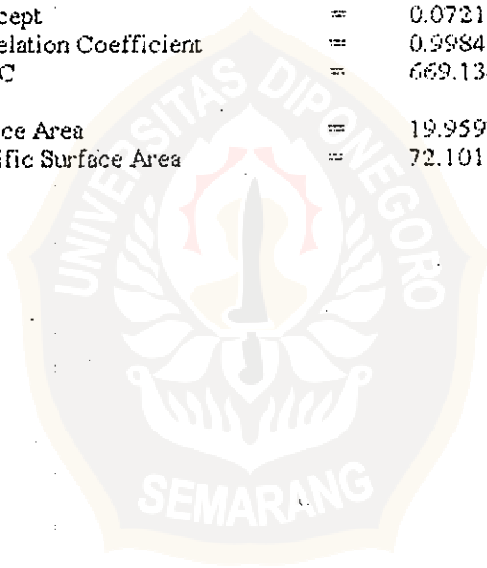
Multi BET (Adsorption)

P/Po BET Transform
(1/(W[Po/P - 1]))

0.047711	2.564866
0.074754	3.489632
0.148021	7.094525
0.196537	9.663424

Slope	=	48.228280
Intercept	=	0.073184
Correlation Coefficient	=	0.998481
BET C	=	669.134241

Surface Area	=	19.959747 sq m
Specific Surface Area	=	72.101099 sq m/g



Quantachrome Corporation
NOVA Data Analysis Package Ver. 2.00
File Name = imron-20.dat

User ID = Imron User Setup = 5
 Sample ID = Zeolit 0 Sample Cell Number = 2
 Sample Weight = 0.2768 g Sample Volume = 0.2768 cc
 Sample Density = 1.0000 g/cc
 Pore Type = User P₀ = 750.23 mm Hg
 Adsorbate = N₂ Bath Temperature = 77.40 deg K
 Adsorption Tolerance = 0.1000 mm Hg Desorption Tolerance = 0.0000 mm Hg
 Adsorption Equil Time = 60 sec Desorption Equil Time = 0 sec
 Adsorption Dwell Time = 180 sec Desorption Dwell Time = 0 sec
 Analysis Start Time = Mon Dec 29 09:45:49 2003 Analysis End Time = Mon Dec 29 11:30:41 2003

DVR (Adsorption)

Pore Radius (Ang)	Pore Area (sq m ² /g e-03)	Pore Volume (cc/g e-03)
522.589658	0.074390	0.001944
160.243985	2.035690	0.016310
101.541715	20.524011	0.104202
77.233545	11.686153	0.045128
59.685806	23.196840	0.069226
49.455180	42.136283	0.104193
43.097337	58.143004	0.125290
36.993545	84.766702	0.156791
32.422209	147.758355	0.239533
29.149442	215.303116	0.313798
26.400346	287.290200	0.379228
24.056204	404.191368	0.486165
22.033110	520.058696	0.572926
20.242577	657.297110	0.665269
18.654954	832.002682	0.776049
17.259302	1055.081021	0.910498
16.004091	1285.710293	1.028831
14.851420	1597.035260	1.185912
13.766325	1986.816858	1.367558

Total Pore Volume is 47.621035 e-03 cc/g for
all pores less than 813.558375 Angstrom.

Average pore radius is 13.209517 Angstrom.

Quantachrome Corporation
NOVA Data Analysis Package Ver. 2.00
File Name = inrron-z0.dat

ID = Ironon User Setup = 5
 Weight = Zeolit O Sample Cell Number = 2
 Density = 0.2768 g Sample Volume = 0.2768 cc
 = 1.0000 g/cc
 User = User Po = 750.23 mm Hg
 = N2 Bath Temperature = 77.40 deg K
 Adsorption Tolerance = 0.1000 mm Hg Desorption Tolerance = 0.0000 mm Hg
 Adsorption Equil Time = 60 sec Desorption Equil Time = 0 sec
 Adsorption Dwell Time = 180 sec Desorption Dwell Time = 0 sec
 Start Time = Mon Dec 29 09:45:49 2003 Analysis End Time = Mon Dec 29 11:30:41 2003

Pore Radius (Ang)	BJH (Adsorption)	
	Cummulative Pore Area (sq m/g e-03)	Cummulative Pore Volume (cc/g e-03)
522.589658	15391.885689	22.219803
160.243985	15344.633735	20.985134
101.541715	15162.444592	19.525399
77.233545	14589.679609	16.617422
59.685806	14347.667910	15.682851
49.455180	14013.953350	14.686950
43.097337	13757.973617	14.053973
36.993545	13371.866698	13.221964
32.422209	12899.975494	12.349118
29.149442	12371.631210	11.492613
26.400346	11732.223360	10.560694
24.056204	11005.842397	9.601859
22.033110	10132.830483	8.551791
20.242577	9151.849193	7.471088
18.654954	8037.877096	6.343605
17.259302	6806.123758	5.194689
16.004091	5423.083884	4.001174
14.851420	3880.767028	2.767005
13.766325	2114.831498	1.455673

Total Pore Volume is 47.621035 e-03 cc/g for all pores less than 813.558375 Angstrom.

Average pore radius is 13.209517 Angstrom.

Quantachrome Corporation
NOVA Data Analysis Package Ver. 2.00
File Name = imron-z0.dat

= Imron	User Setup	= 5
= Zeolit 0	Sample Cell Number	= 2
= 0.2768 g	Sample Volume	= 0.2768 cc
= 1.0000 g/cc		
= User	Po	= 750.23 mm Hg
= N2	Bath Temperature	= 77.40 deg K
Tolerance	Desorption Tolerance	= 0.0000 mm Hg
Equil Time	Desorption Equil Time	= 0 sec
Dwell Time	Desorption Dwell Time	= 0 sec
Start Time	Analysis End Time	= Mon Dec 29 11:30:41 2003
		= Mon Dec 29 09:45:49 2003

ISOTHERM (Adsorption)

P/Po	Volume (cc/g)
0.047711	15.629269
0.074754	18.524824
0.148021	19.594062
0.196537	20.253478
0.242388	20.829909
0.285392	21.318342
0.324115	21.769606
0.361332	22.188505
0.398333	22.594472
0.435014	22.996398
0.472179	23.395532
0.509846	23.798617
0.546527	24.195341
0.582862	24.591740
0.619127	24.968849
0.654865	25.346631
0.690309	25.708477
0.733504	26.102487
0.771958	26.490887
0.798794	26.793847
0.843045	27.298092
0.881161	27.797090
0.910705	29.276571
0.950604	30.079739
0.988323	30.829803

Quantachrome Corporation
NOVA Data Analysis Package Ver. 2.00
File Name = irron-zi.dat

D	= Iron	User Setup	= 5
e ID	= Zeolit 1	Sample Cell Number	= 2
e Weight	= 0.3332 g	Sample Volume	= 0.3332 cc
e Density	= 1.0000 g/cc		
pe	= User	Po	= 748.12 mm.Hg
bale	= N2	Bath Temperature	= 77.40 deg K
ption Tolerance	= 0.1000 mm Hg	Desorption Tolerance	= 0.0000 mm Hg
ption Equil Time	= 60 sec	Desorption Equil Time	= 0 sec
ption Dwell Time	= 180 sec	Desorption Dwell Time	= 0 sec
ns Start Time	= Mon Dec 29 12:55:06 2003	Analysis End Time	= Mon Dec 29 14:55:01 2003

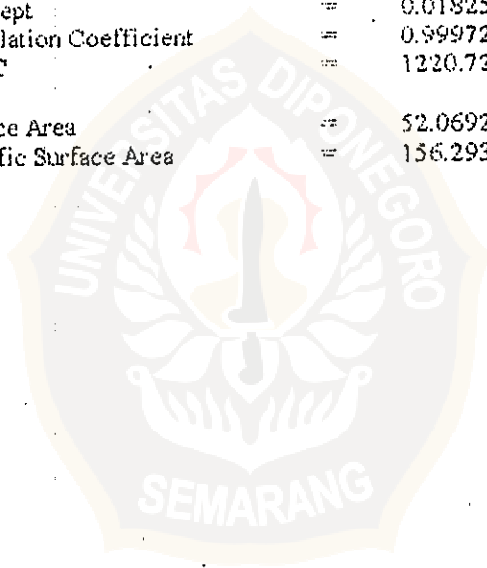
Multi BET (Adsorption)

P/Po	BET Transform (1/(W[Po/P - 1]))
------	------------------------------------

0.049381	1.145133
0.070150	1.567794
0.140813	3.108878
0.197282	4.439617

Slope	=	22.263640
Intercept	=	0.018253
Correlation Coefficient	=	0.999727
BET C	=	1220.727220

Surface Area	=	52.069202 sq m
Specific Surface Area	=	156.293568 sq m/g



D = Iron User Setup = 5
 e ID = Zeolit I Sample Cell Number = 2
 e Weight = 0.3332 g Sample Volume = 0.3332 cc
 e Density = 1.0000 g/cc
 pe = User Po = 748.12 mm Hg
 bate = N2 Bath Temperature = 77.40 deg K
 ption Tolerance = 0.1000 mm Hg Desorption Tolerance = 0.0000 mm Hg
 ption Equil Time = 60 sec Desorption Equil Time = 0 sec
 ption Dwell Time = 180 sec Desorption Dwell Time = 0 sec
 sis Start Time = Mon Dec 29 12:55:06 2003 Analysis End Time = Mon Dec 29 14:55:01 2003

BJH (Adsorption)		
Fore Radius (Ang)	Cummulative Pore Area (sq m/g e-03)	Cummulative Pore Volume (cc/g e-03)
609.262080	19088.042090	22.710449
173.493543	19062.676038	21.937720
105.928558	18968.359825	21.119557
76.867227	18801.452017	20.235542
59.475147	18577.583464	19.374911
48.808275	18217.715217	18.304750
42.680356	17948.746798	17.648356
36.947287	17576.952934	16.854941
32.372354	17078.460346	15.934043
29.104280	16471.667497	14.951878
26.371307	15779.837208	13.945117
23.899564	14887.831093	12.768948
21.831878	13907.557899	11.597543
20.074589	12770.857602	10.356728
18.500936	11432.025966	9.012903
17.088685	9896.064080	7.592067
15.888963	8025.324408	5.993643
14.803104	4583.644463	3.259406
13.746058	2520.268860	1.732188

Total Pore Volume is 84.367420 e-03 cc/g for all pores less than 968.446961 Angstrom.

Average pore radius is 10.796020 Angstrom.

Sample ID = Imron User Setup = 5
 Sample Weight = 0.3332 g Sample Cell Number = 2
 Sample Density = 1.0000 g/cc Sample Volume = 0.3332 cc
 Adsorbate = N₂ P₀ = 748.12 mm Hg
 Adsorbate = N₂ Bath Temperature = 77.40 deg K
 Adsorption Tolerance = 0.1000 mm Hg Desorption Tolerance = 0.0000 mm Hg
 Adsorption Equil Time = 60 sec Desorption Equil Time = 0 sec
 Adsorption Dwell Time = 180 sec Desorption Dwell Time = 0 sec
 Analysis Start Time = Mon Dec 29 12:55:06 2003 Analysis End Time = Mon Dec 29 14:55:01 2003

DVR (Adsorption)			
Pore Radius (Ang)		Pore Area (sq m ² /g e-03)	Pore Volume (cc/g e-03)
609.262080	0.032738	0.000997	
173.493545	0.975092	0.008459	
105.928558	4.346047	0.023019	
76.887227	11.376503	0.043735	
59.475147	23.759941	0.070656	
48.808275	43.467977	0.106080	
42.680356	61.270225	0.130752	
36.947287	92.346993	0.170599	
32.372354	161.732619	0.261783	
29.104280	248.473690	0.361582	
26.371307	332.636291	0.438603	
23.899564	433.392313	0.517894	
21.831878	606.722218	0.662294	
20.074589	815.829655	0.818872	
18.500936	1019.733955	0.943302	
17.088585	1419.092672	1.212521	
15.888963	3183.262419	2.528937	
14.803104	1892.071621	1.400427	
13.746058	2462.274214	1.692328	

Total Pore Volume is 84.367420 e-03 cc/g for all pores less than 968.446961 Angstrom.

Average pore radius is 10.796020 Angstrom.

Quantachrome Corporation
NOVA Data Analysis Package Ver. 2.00
File Name = imron-zi.dat

Imron	=	User Setup	=	5
Zeolit I	=	Sample Cell Number	=	2
Weight	=	Sample Volume	=	0.3332 cc
Density	=			
	=	Po	=	748.12 mm Hg
User	=	Bath Temperature	=	77.40 deg K
N2	=			
Desorption Tolerance	=	Desorption Tolerance	=	0.0000 mm Hg
Desorption Equil Time	=	Desorption Equil Time	=	0 sec
Desorption Dwell Time	=	Desorption Dwell Time	=	0 sec
Start Time	=	Analysis End Time	=	Mon Dec 29 14:55:01 2003
				Mon Dec 29 12:55:06 2003

ISOTHERM (Adsorption)

P/Po	Volume (cc/g)
0.049381	36.295361
0.070150	38.501650
0.140813	42.179841
0.197282	44.292599
0.249421	45.336368
0.285399	45.877123
0.322686	46.410688
0.359523	46.901948
0.393166	47.679876
0.430549	48.191849
0.468817	48.668313
0.505757	49.129949
0.542732	49.571379
0.581208	50.004829
0.619754	50.451370
0.653345	50.844123
0.690650	51.243739
0.732622	51.639606
0.768400	51.992405
0.796457	52.291587
0.843452	52.801860
0.879942	53.230173
0.917802	53.692266
0.954464	54.146347
0.990181	54.619370

092,221

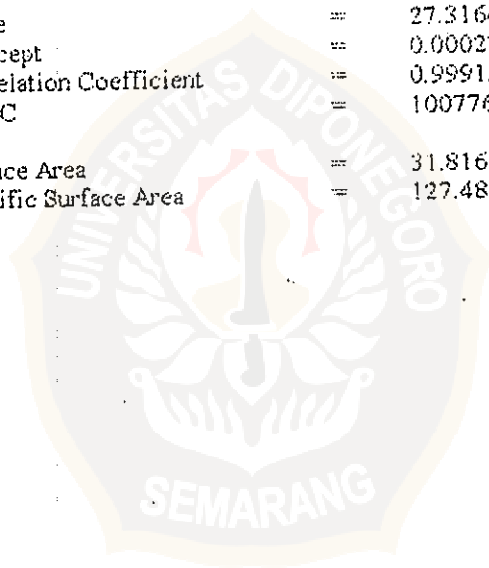
3 Hasil Analisis Luas Permukaan Zeolit-II

Quantachrome Corporation
NOVA Data Analysis Package Ver. 2.00
File Name = ironon-22.dat

Ironon	= Ironon	User Setup	= 5
ID	= ZeolII	Sample Cell Number	= 4
Weight	= 0.2496 g	Sample Volume	= 0.2496 cc
Density	= 1.0000 g/cc		
User	= User	Po	= 749.56 mm Hg
Date	= N2	Bath Temperature	= 77.40 deg K
Desorption Tolerance	= 0.1000 mm Hg	Desorption Tolerance	= 0.0000 mm Hg
Desorption Equil Time	= 60 sec	Desorption Equil Time	= 0 sec
Desorption Dwell Time	= 180 sec	Desorption Dwell Time	= 0 sec
Analysis Start Time	= Wed Dec 31 08:54:55 2003	Analysis End Time	= Wed Dec 31 10:39:12 2003

Multi BET (Adsorption)

P/Po	BET Transform (1/{W{Po/P - 1}})
0.055088	1.552709
0.067911	1.842074
0.147365	3.924521
0.197301	5.456711
Slope	= 27.316413
Intercept	= 0.000271
Correlation Coefficient	= 0.999156
BET C	= 100776.922796
Surface Area	= 31.816880 sq m
Specific Surface Area	= 127.486798 sq m/g



ID = Imron User Setup = 5
 Sample ID = ZeoII Sample Cell Number = 4
 Sample Weight = 0.2496 g Sample Volume = 0.2496 cc
 Sample Density = 1.0000 g/cc
 Operator = User P₀ = 749.56 mm Hg
 Substrate = N₂ Bath Temperature = 77.40 deg K
 Adsorption Tolerance = 0.1000 mm Hg Desorption Tolerance = 0.0000 mm Hg
 Adsorption Equil Time = 60 sec Desorption Equil Time = 0 sec
 Adsorption Dwell Time = 180 sec Desorption Dwell Time = 0 sec
 Analysis Start Time = Wed Dec 31 08:54:55 2003 Analysis End Time = Wed Dec 31 10:39:12 2003

Pore Radius (Ang)	BJH (Adsorption) Cumulative Pore Area (sq m/g e-03)	Cummulative Pore Volume (cc/g e-03)
708.618868	14802.704815	18.283728
164.970439	14776.951935	17.371280
100.390733	14642.586037	16.262960
76.363176	14533.279986	15.714294
60.105221	14297.893782	14.815552
50.356230	14174.390800	14.444393
42.335750	13811.830447	13.531535
37.340868	13505.765548	12.883660
32.891323	13062.773917	12.056576
29.432375	12562.674989	11.234130
26.593077	12008.135589	10.418059
24.193134	11371.051121	9.570957
22.094355	10638.059508	8.684289
20.302288	10012.691982	7.993435
18.713748	9434.852751	7.406862
17.325678	8109.934722	6.167153
16.058617	6641.141141	4.894760
14.882428	4875.820206	3.477350
13.800708	2789.492920	1.924849

Total Pore Volume is 68.998851 e-03 cc/g for all pores less than 1169.546162 Angstrom.

Average pore radius is 10.824470 Angstrom.

Quantachrome Corporation
NOVA Data Analysis Package Ver. 2.00
File Name = imron-z2.dat

Sample ID	= Imron	User Setup	= 5
Sample ID	= ZeoII	Sample Cell Number	= 4
Sample Weight	= 0.2496 g	Sample Volume	= 0.2496 cc
Sample Density	= 1.0000 g/cc		
Type	= User	Po	= 749.56 mm Hg
Sorbate	= N2	Bath Temperature	= 77.40 deg K
Adsorption Tolerance	= 0.1000 mm Hg	Desorption Tolerance	= 0.0000 mm Hg
Adsorption Equil Time	= 60 sec	Desorption Equil Time	= 0 sec
Adsorption Dwell Time	= 180 sec	Desorption Dwell Time	= 0 sec
Analysis Start Time	= Wed Dec 31 08:54:55 2003	Analysis End Time	= Wed Dec 31 10:39:12 2003

Pore Radius (Ang)	DVR (Adsorption)	
	Pore Area (sq m/A/g e-03)	Pore Volume (cc/A/g e-03)
708.618868	0.0262261	0.000929
164.970439	1.275585	0.010522
100.390733	4.588304	0.023031
75.363176	9.713714	0.037089
60.105221	14.909425	0.044807
50.356230	32.329800	0.081400
42.335750	63.413059	0.134232
37.340868	85.797282	0.160187
32.891323	133.864742	0.220149
29.432375	174.271409	0.256461
26.593077	255.185892	0.339309
24.193134	318.230371	0.384949
22.094355	330.145069	0.364717
20.302288	341.934015	0.347102
18.713748	890.901782	0.833606
17.325678	1139.504892	0.987135
16.058617	1417.760916	1.138364
14.882428	1884.277007	1.402131
13.800708	2641.038930	1.822410

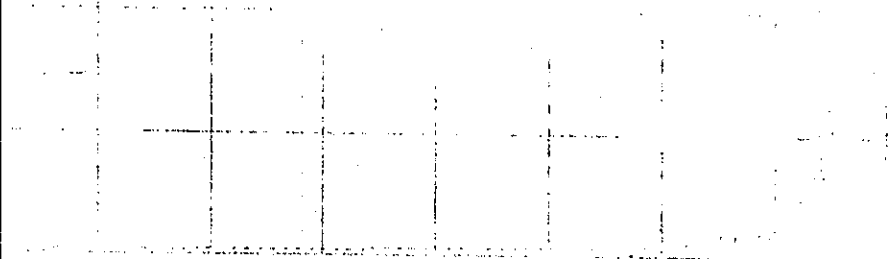
Total Pore Volume is 68.998851 e-03 cc/g for
all pores less than 1169.546162 Angstrom.

Average pore radius is 10.824470 Angstrom.

ID = Iron
 Weight = ZeoII
 Density = 0.2496 g
 = 1.0000 g/cc
 User Setup = 5
 Sample Cell Number = 4
 Sample Volume = 0.2496 cc
 User = User
 Po = N2
 Bath Temperature = 749.56 mm Hg
 = 77.40 deg K
 Adsorption Tolerance = 0.1000 mm Hg
 Desorption Tolerance = 0.0000 mm Hg
 Adsorption Equil Time = 60 sec
 Desorption Equil Time = 0 sec
 Adsorption Dwell Time = 180 sec
 Desorption Dwell Time = 0 sec
 Analysis Start Time = Wed Dec 31 08:54:55 2003
 Analysis End Time = Wed Dec 31 10:39:12 2003

ISOTHERM (Adsorption)

P/Po	Volume (cc/g)
0.055088	30.042027
0.067911	31.646759
0.147365	35.236931
0.197301	36.041194
0.247635	36.779372
0.286842	37.455375
0.325175	37.999170
0.362356	38.460424
0.400602	38.898170
0.436484	39.300790
0.473648	39.704161
0.511037	39.931744
0.547707	40.195245
0.586092	40.529421
0.621446	40.855161
0.659086	41.182192
0.695150	41.519263
0.734478	41.872361
0.763338	42.155154
0.811542	42.576330
0.836428	42.757601
0.882398	43.208456
0.908080	43.493635
0.953556	44.106584
0.991863	44.669776



NOVA Data Analysis Package Ver. 2.00
File Name = iron-22.dat