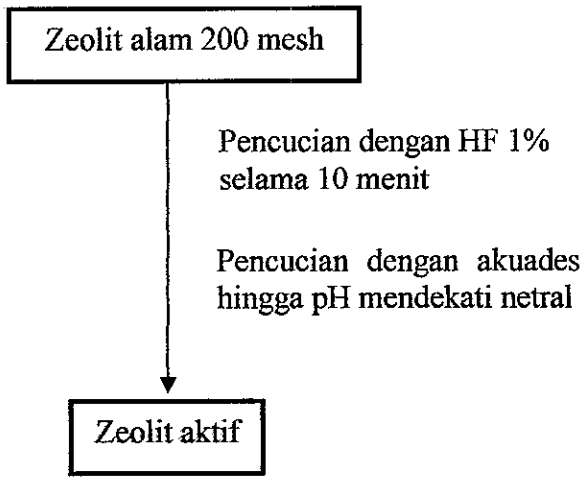
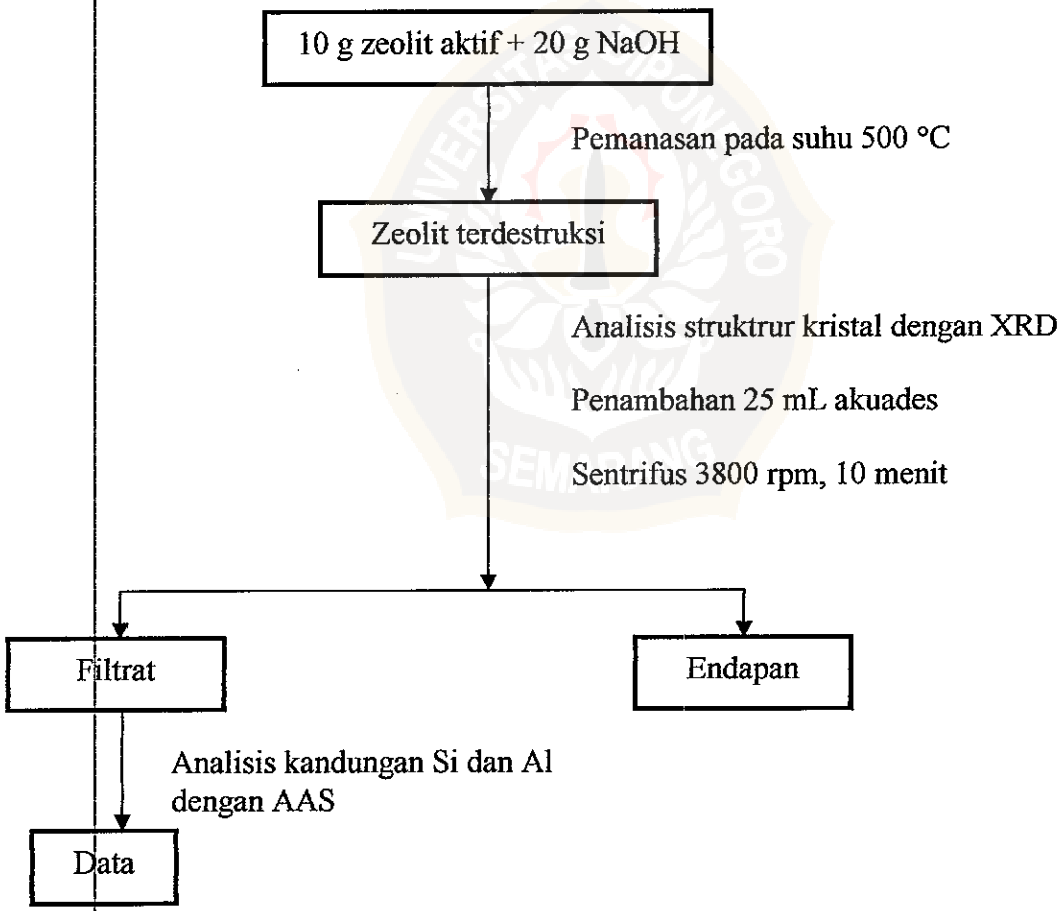
Lampiran A. Skema kerja modifikasi zeolit alam

Preparasi zeolit alam

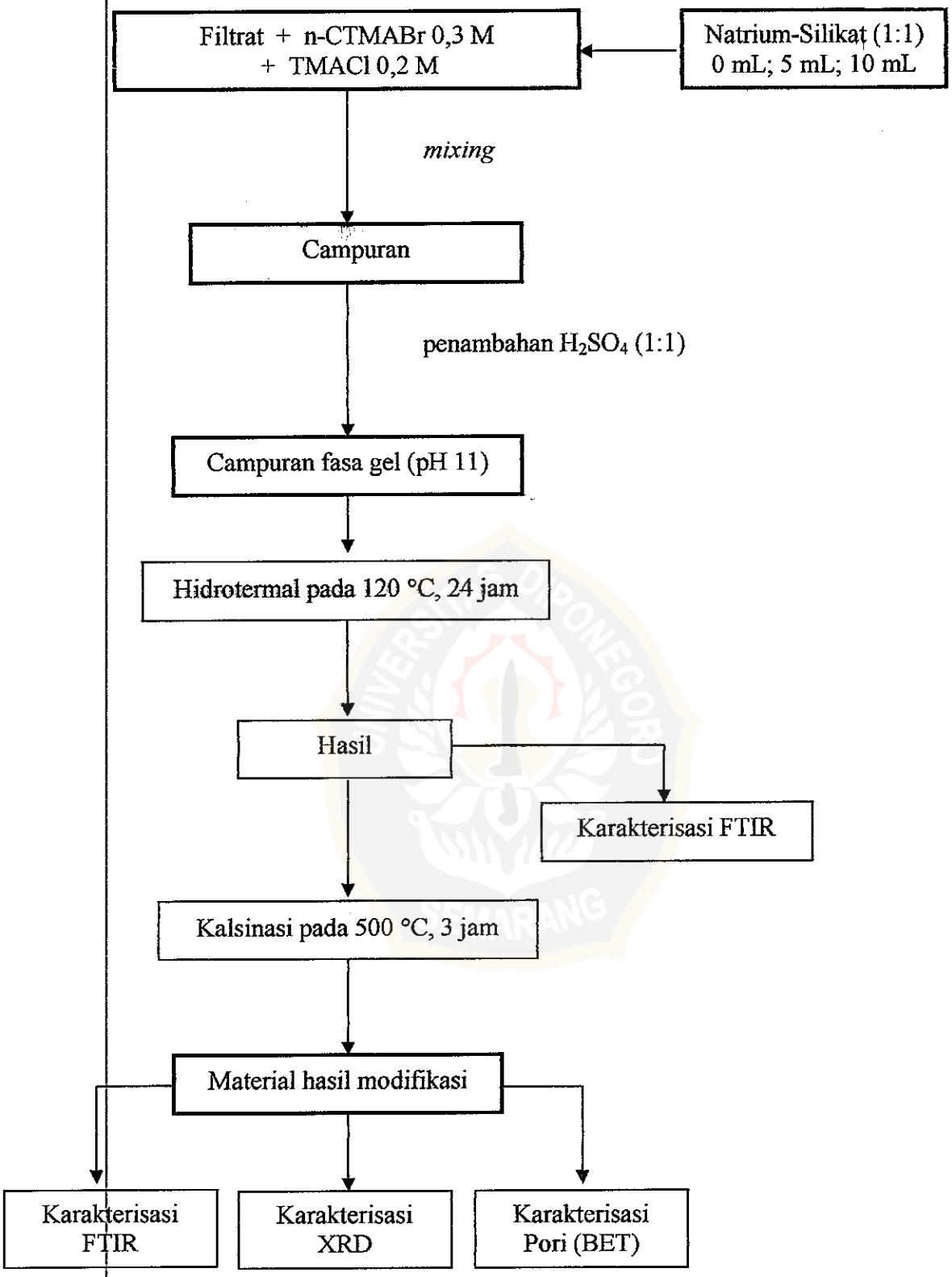


Keterangan: dibuat sesuai keperluan

Destruksi zeolit alam



Lampiran A (lanjutan)
Modifikasi zeolit alam



Lampiran B. Perhitungan Preparasi Bahan

B.1 Pembuatan larutan HF 1 %

Diketahui: % w/w = 50 %

$$V_0 = \frac{N \times V}{N_0}$$

Dimana V_0 : volume HF 50 % yang dibutuhkan

N_0 : % w/w HF awal

N : % w/w HF yang digunakan

V : volume larutan HF yang diinginkan

$$V_0 = \frac{1\% \times 2000 mL}{50\%} = 40 mL$$

B.2 Pembuatan 100 mL larutan n-CTMABr 0,3 M

$n = M \times V$

Dimana M : molaritas larutan

V : volume larutan yang akan dibuat

n : jumlah mol

$$n = 0{,}3 M \times 100 mL = 30 mmol = 0{,}03 mol$$

Massa n-CTMABr yang dibutuhkan untuk membuat 0,03 mol n-CTMABr dihitung dengan rumus g = n x massa molekul relatif n-CTMABr

$$g = n \times \text{massa molekul relatif } n-CTMABr$$
$$= 0{,}03 mol \times 364{,}4 g/mol$$
$$= 10{,}932 g$$

B.3 Pembuatan 50 mL larutan TMACl 0,2 M

$n = M \times V$

Dimana: M : molaritas larutan

V : volume larutan yang akan dibuat

n : jumlah mol

$$n = M \times V$$
$$= 0{,}2\,M \times 50\,mL$$
$$= 10\,mmol = 0{,}01\,mol$$

Gram TMACl yang dibutuhkan untuk membuat 0,01 mol TMACl adalah

$$gram = mol \times Mr\ TMACl$$
$$= 0{,}01\,mol \times 109{,}6\,g/mol$$
$$= 1{,}096\,g$$

B.4 Perhitungan kadar Si dalam waterglass atau natrium-silikat

Diketahui : SiO_2 (Si = 28, O = 16)

% w/w SiO_2 = 27 %

ρ = 1,35 kg/L

Jumlah SiO_2 dalam 1 L natrium-silikat

$$massa\ SiO_2 = \%\,w/w \times massa\ total$$
$$= \frac{27}{100} \times 1{,}35\,kg = 0{,}3645\,kg$$

Jadi dalam 1 L larutan natrium-silikat terdapat 0,3645 kg SiO_2 atau dalam 1 mL larutan natrium-silikat terdapat 0,3645 g SiO_2.

$$\%\,Si\ dalam\ SiO_2 = \frac{massa\ atom\ relatif\ Si}{massa\ molekul\ relatif\ SiO_2} \times 100\%$$
$$= \frac{28}{60} \times 100\% = 46{,}67\%$$

Jumlah Si dalam 1 mL larutan natrium-silikat $= 46{,}67\% \times 0{,}3465\,g = 0{,}17011215\,g$

Jumlah mol Si per mL

$$n = \frac{g}{massa\ atom\ relatif\ Si}$$
$$= \frac{0{,}17011215\,g}{28\,g/mol} = 6{,}075 \times 10^{-3}\ mol$$

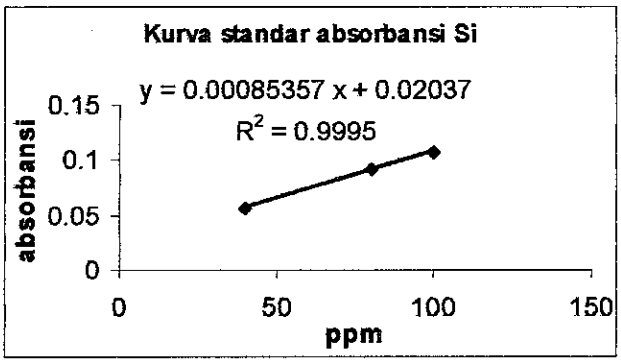
Jadi dalam 1 mL larutan natrium-silikat terdapat 6,075 x 10^{-3} mol Si

Lampiran C. Penentuan Kadar Si dan Al dalam filtrat zeolit alam

C.1 Kadar Si filtrat hasil destruksi zeolit alam

Data Absorbansi Standar Si

ppm	Absorbansi
40	0,057
80	0,092
100	0,108



Diperoleh persamaan **y = 0,00085357 x + 0,02307**
Data absorbansi sampel

Sampel	Absorbansi	Faktor pengenceran
Filtrat zeolit destruksi	0,061	1250 x

$0{,}061 = 0{,}00085357x + 0{,}02037$

$x = 44{,}44\ \text{ppm}$

Rumus yang digunakan untuk menghitung kadar Si:

$$\text{ppm} = \frac{\text{ppm perhitungan x volume induk x pengenceran}}{\text{gram penimbangan}}$$

$$\text{ppm} = \frac{44{,}44 \times 1 \times 1250}{1} = 55550\ \text{ppm}$$

Dalam 1 mL filtrat terdapat Si sebesar 55550 ppm, dihitung dalam bentuk mol sebagai berikut:

$$\text{mol} = \frac{\text{gram Si}}{\text{massa atom relatif Si}}$$

$$\text{mol} = \frac{55550\ \text{mg/L}}{28\ \text{g/mol}}$$

$$\text{mol} = \frac{55{,}55 \times 10^{-3}\ \text{g/mL}}{28\ \text{g/mol}}$$

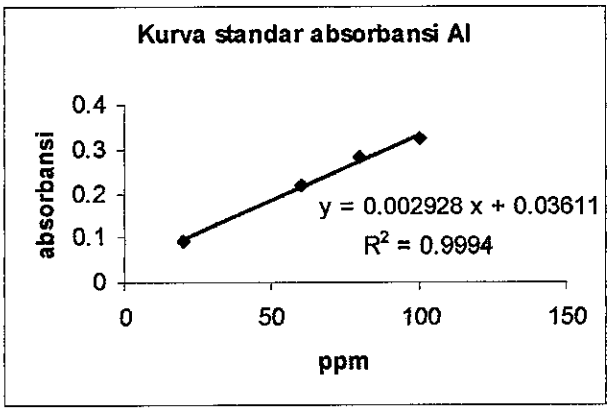
$$\text{mol} = 1{,}984 \times 10^{-3}\ \text{mol}$$

Jadi dalam 1 mL filtrat terdapat Si sebanyak 1,984 x 10^{-3} mol.

C.2 Kadar Al filtrat hasil destruksi zeolit alam

Data Absorbansi Standar Al

ppm	Absorbansi
20	0,091
60	0,221
80	0,282
100	0,326



Diperoleh persamaan **y = 0,0029828 x + 0,03611**
Data absorbansi sampel

Sampel	Absorbansi	Faktor pengenceran
Filtrat zeolit destruksi	0,128	125 x

$0{,}128 = 0{,}0028828x + 0{,}03611$

$x = 30{,}81 \text{ppm}$

Rumus yang digunakan untuk menghitung kadar Al

$$\text{ppm} = \frac{\text{ppm perhitungan x volume induk x pengenceran}}{\text{gram penimbangan}}$$

$$\text{ppm} = \frac{30{,}81 \text{x} 1 \text{x} 125}{1} = 381{,}25 \text{ppm}$$

Dalam 1 mL filtrat terdapat Al sebesar 381,25 ppm, dihitung dalam bentuk mol sebagai berikut:

$$\text{mol} = \frac{\text{gram Al}}{\text{massa atom relatif Al}}$$

$$\text{mol} = \frac{3851{,}25 \text{mg/L}}{27 \text{g/mol}}$$

$$\text{mol} = \frac{3{,}85125 \text{x} 10^{-3} \text{ g/mL}}{27 \text{g/mol}}$$

$$\text{mol} = 1{,}426 \text{x} 10^{-4} \text{ mol}$$

Jadi dalam 1 mL filtrat terdapat Al sebanyak $1{,}426 \text{x} 10^{-4}$ mol.

C.3 Perhitungan rasio Si/Al dalam filtrat hasil destruksi zeolit alam

$$\text{Rasio Si / Al} = \frac{\text{mol Si}}{\text{mol Al}} = \frac{1{,}984 \times 10^{-3}}{1{,}426 \times 10^{-4}} = 13{,}91$$

Jadi rasio Si/Al dalam filtrat zeolit alam adalah 13,91

C.4 Perhitungan kadar Si dalam larutan garam Natrium-Silikat + H_2O (1:1)

Telah diketahui sebelumnya bahwa dalam 1 mL larutan garam Natrium-Silikat terdapat jumlah Si 6,075 x 10^{-3} mol, maka jumlah Si dalam larutan garam Natrium-Silikat (1:1) dihitung sebagai berikut:

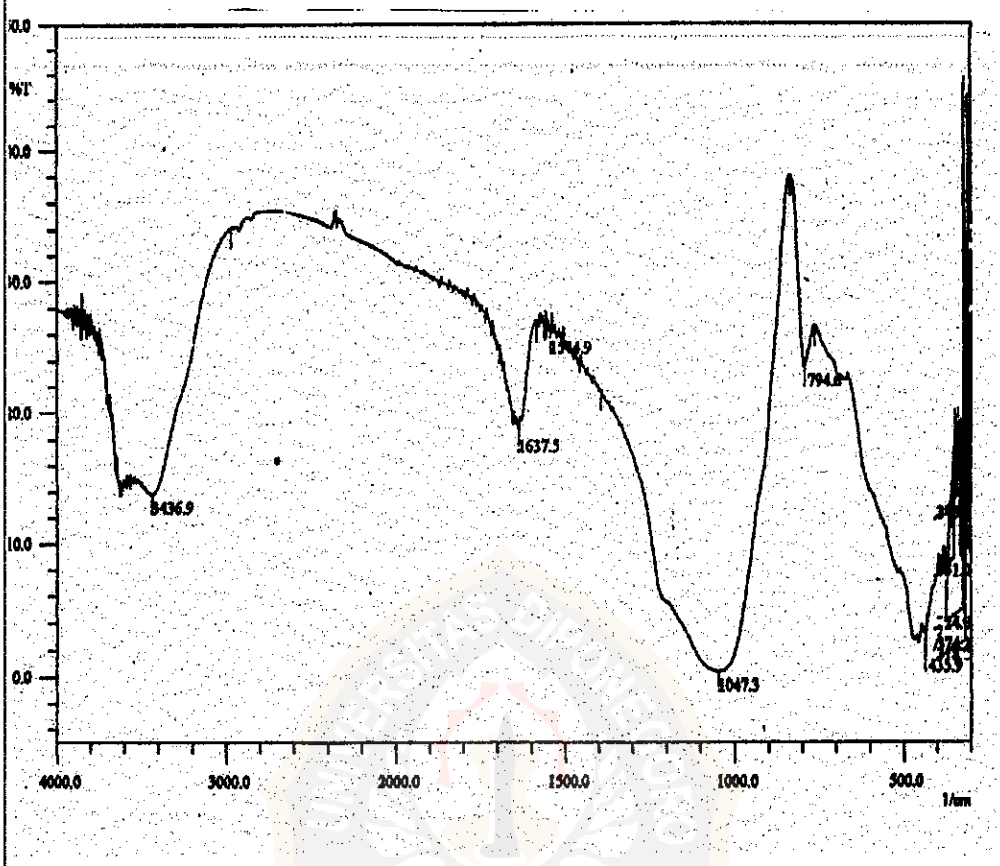
$$\text{mol Si/mL} = \frac{6{,}075 \times 10^{-3}\ \text{mol}}{2} = 3{,}038 \times 10^{-3}\ \text{mol}$$

Jadi dalam 1 mL larutan garam Natium-Silikat (1:1) terdapat 3,038 x 10^{-3} mol Si.

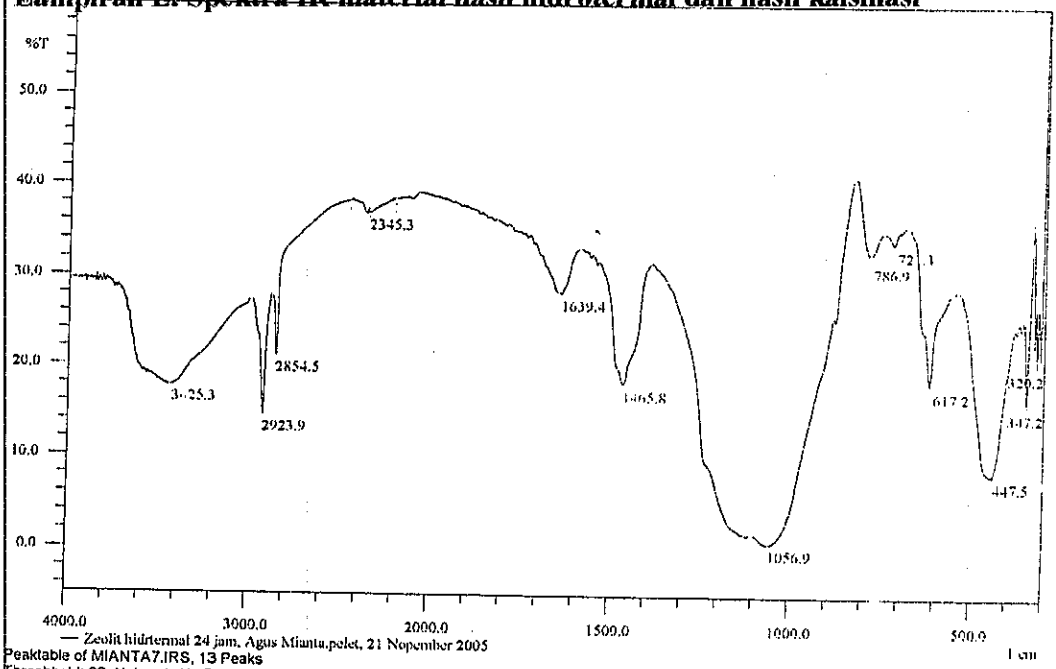
Tabel komposisi bahan modifikasi pori zeolit alam dengan variasi rasio Si/Al

Sampel	Filtrat	Na Silikat (1:1)	n-CTMABr 0,3 M	TMACl 0,2 M	Rasio Si/Al	Rasio n-CTMABr/Si
ZSA-1	15 mL	-	10 mL	5 mL	**13,91**	1,01
ZSA-2	10 mL	5 mL	10 mL	5 mL	**24,57**	0,86
ZSA-3	10 mL	10 mL	10 mL	5 mL	**35,22**	0,60

Lampiran D. Spektra inframerah zeolit alam Wonosari



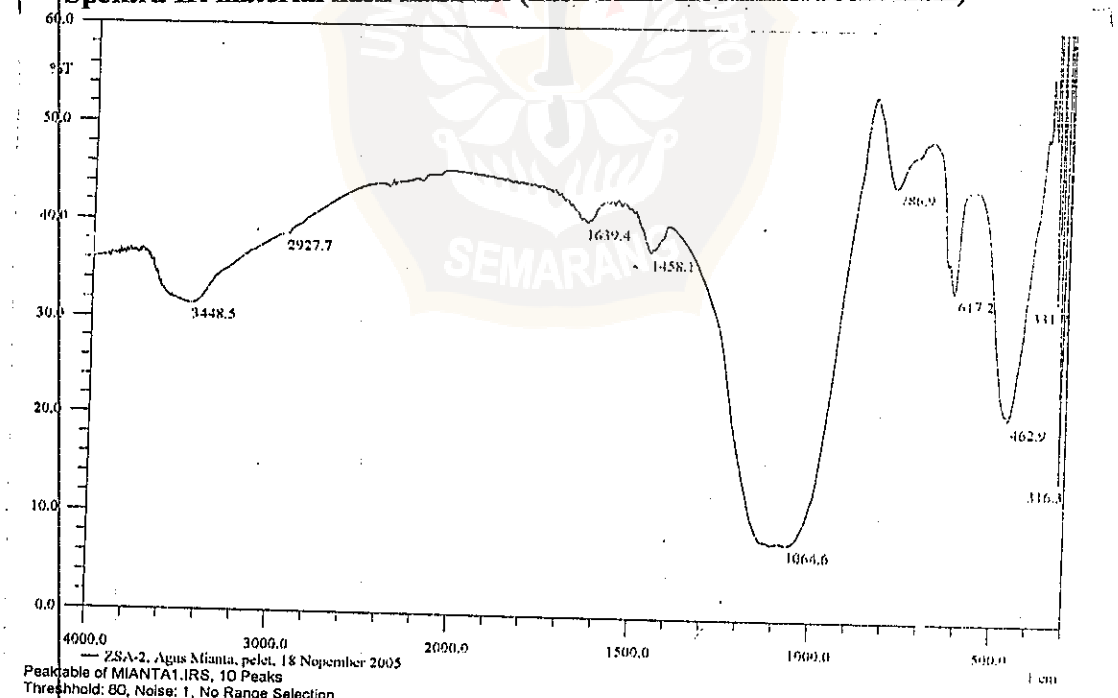
Lampiran E. Spektra IR material hasil hidrotermal dan hasil kalsinasi



— Zeolit hidrtermal 24 jam, Agus Mianta,pelet, 21 Nopember 2005
Peaktable of MIANTA7.IRS, 13 Peaks
Threshhold: 80, Noise: 1, No Range Selection

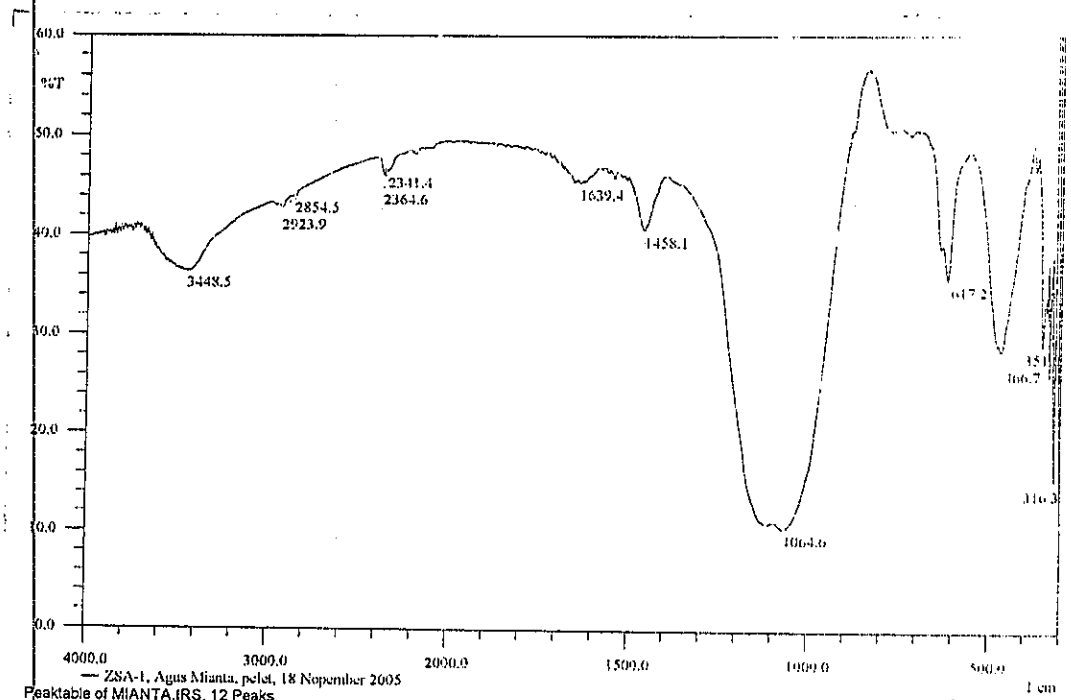
Nr.	Pos. (1/cm)	Inten. (%T)
1	320.2	20.288
2	347.2	15.968
3	447.5	8.418
4	617.2	18.200
5	721.3	33.742
6	786.9	32.705
7	1056.9	0.992
8	1465.8	18.142
9	1639.4	28.116
10	2345.3	36.833
11	2854.5	21.050
12	2923.9	14.487
13	3425.3	17.723

Spektra IR material hasil kalsinasi (hasil akhir modifikasi zeolit alam)



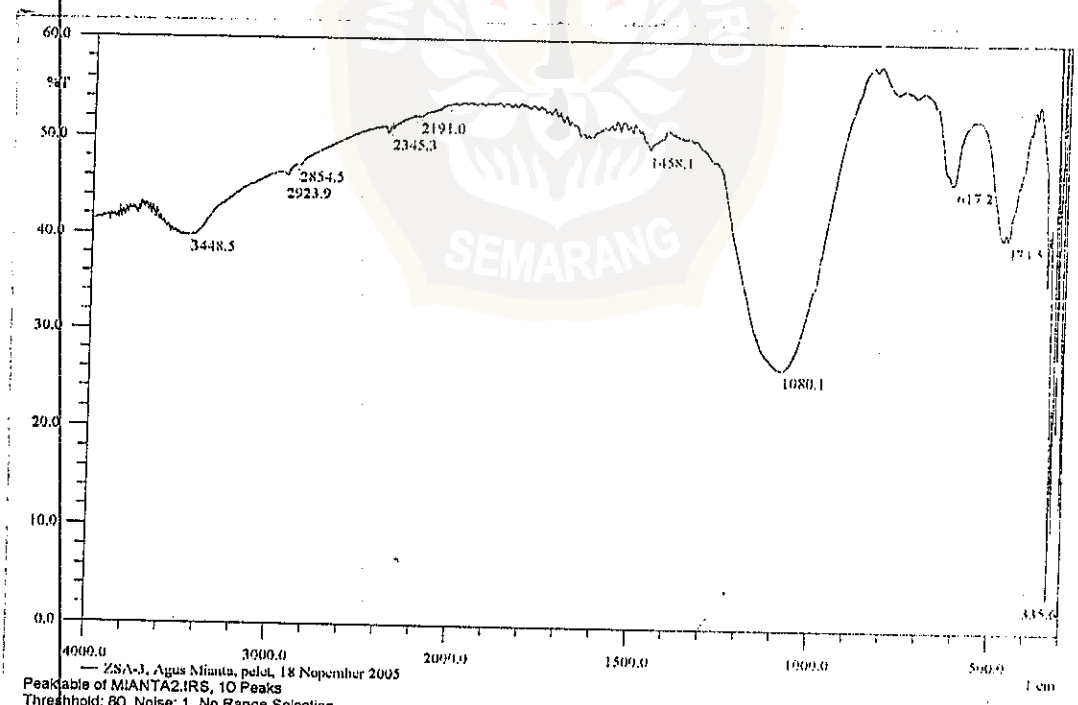
— ZSA-2, Agus Mianta, pelet, 18 Nopember 2005
Peaktable of MIANTA1.IRS, 10 Peaks
Threshhold: 80, Noise: 1, No Range Selection

Nr.	Pos. (1/cm)	Inten. (%T)
1	316.3	14.347
2	331.7	32.478
3	462.9	20.513
4	617.2	33.543
5	786.9	44.344
6	1064.6	7.771
7	1458.1	37.271
8	1639.4	40.239
9	2927.7	38.665
10	3448.5	31.413



— ZSA-1, Agus Mianta, pelet, 18 Nopember 2005
Peaktable of MIANTA.IRS, 12 Peaks
Threshhold: 80, Noise: 1, No Range Selection

Nr.	Pos. (1/cm)	Inten. (%T)
1	316.3	15.028
2	351.0	28.665
3	466.7	28.364
4	617.2	35.592
5	1064.6	10.427
6	1458.1	40.523
7	1639.4	45.296
8	2341.4	46.492
9	2364.6	46.039
10	2854.5	43.927
11	2923.9	42.830
12	3448.5	36.399

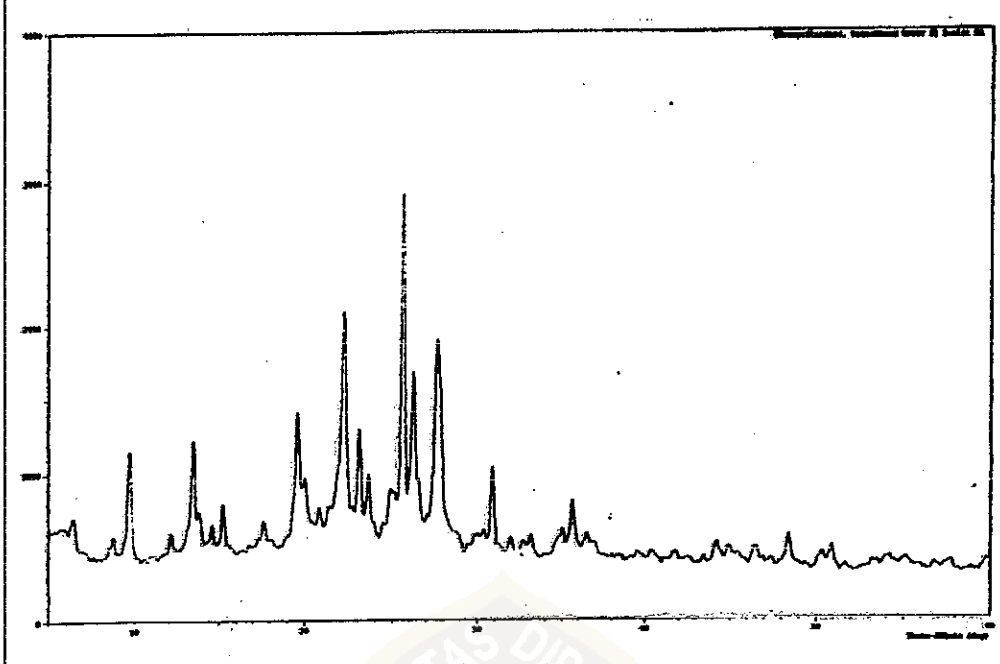


— ZSA-3, Agus Mianta, pelet, 18 Nopember 2005
Peaktable of MIANTA2.IRS, 10 Peaks
Threshhold: 80, Noise: 1, No Range Selection

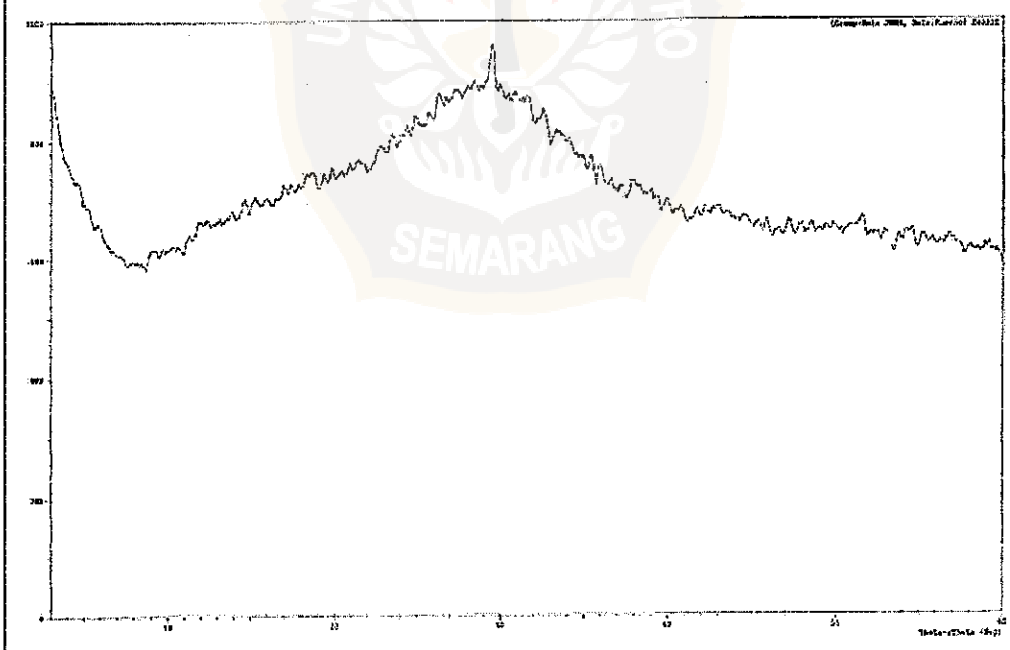
Nr.	Pos. (1/cm)	Inten. (%T)
1	335.6	3.446
2	474.5	40.037
3	617.2	45.751
4	1080.1	26.305
5	1458.1	49.063
6	2191.0	52.235
7	2345.3	50.851
8	2854.5	47.103
9	2923.9	46.096
10	3448.5	39.748

Lampiran F. Difraktogram zeolit alam Wonosari

F.1 Difraktogram zeolit alam sebelum proses destruksi



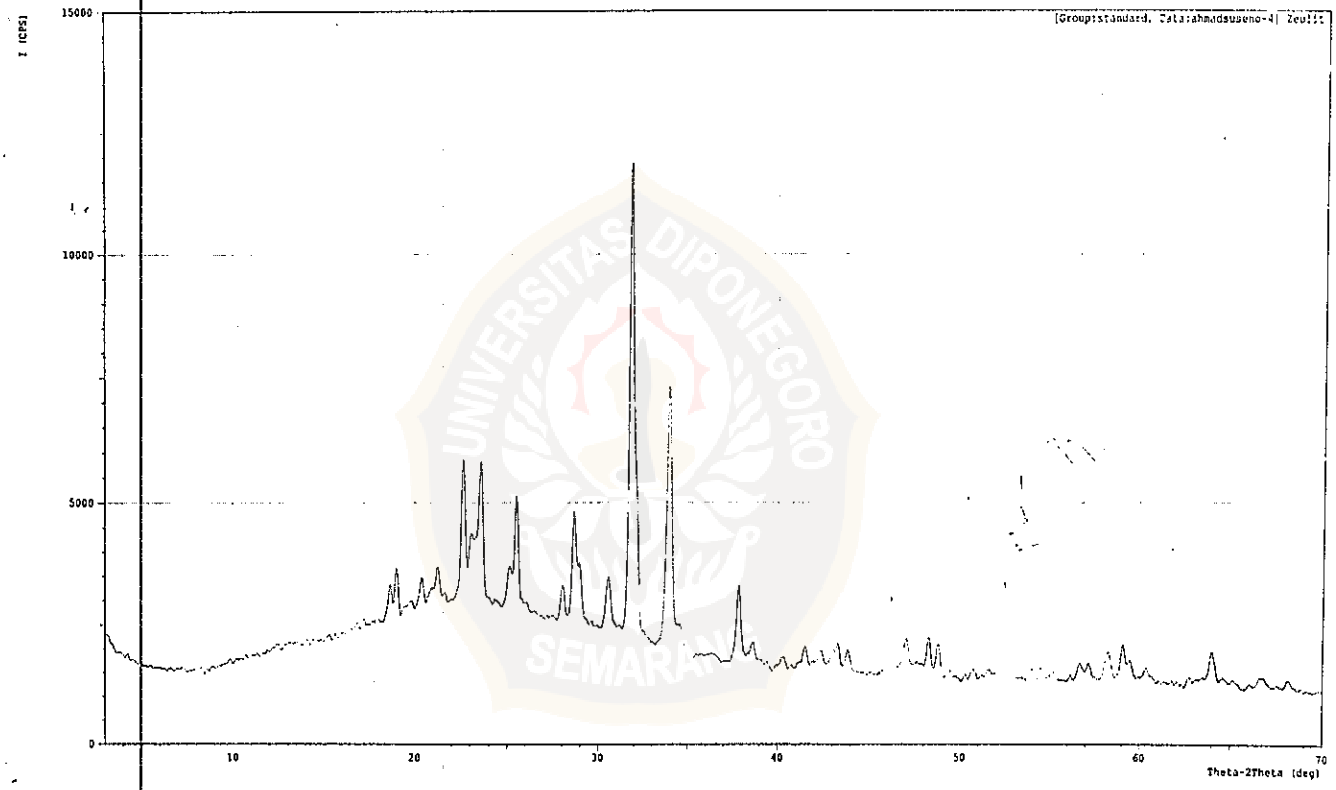
F.2 Difraktogram zeolit alam setelah proses destruksi



Lampiran G. Difraktogram material hasil modifikasi

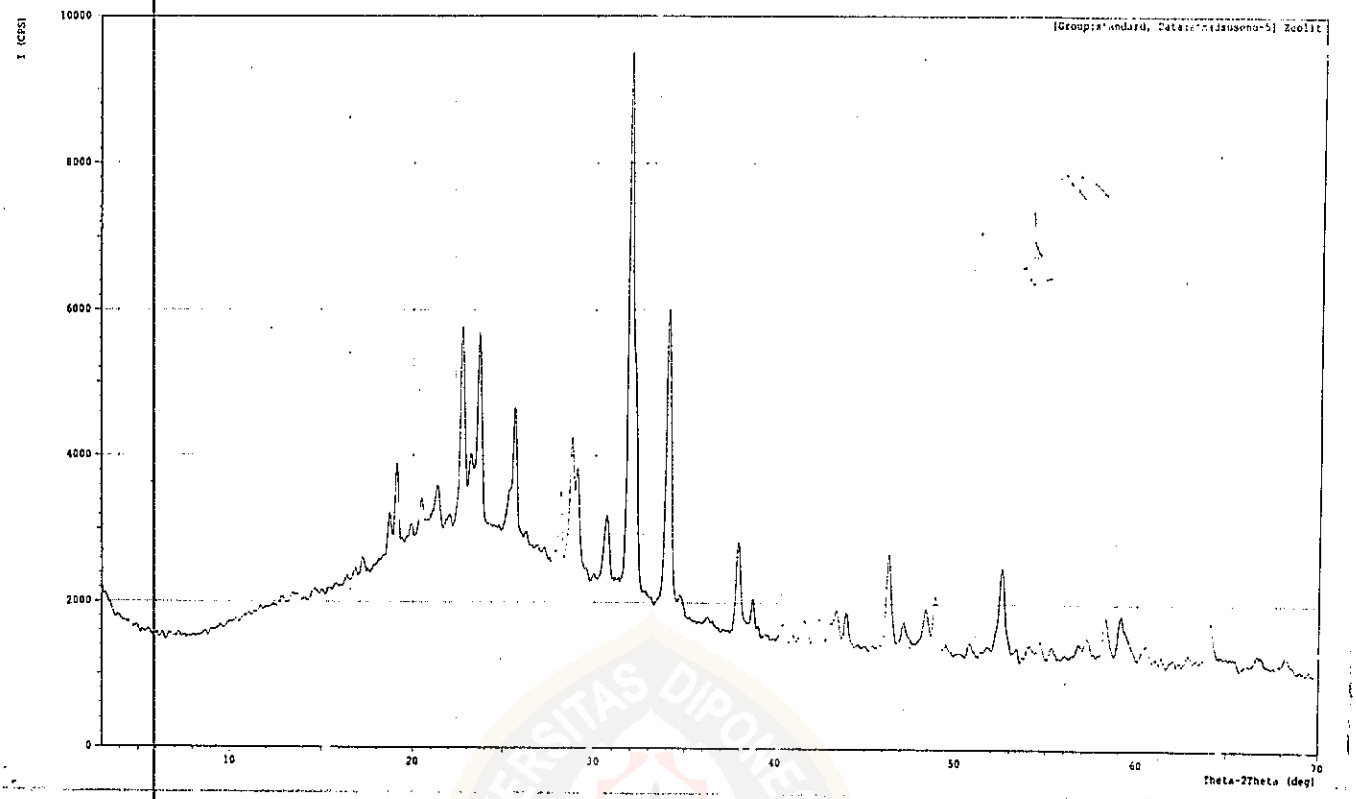
```
                    ***   Multi Plot  ***

File Name     : standard\ahmadsuseno-4
Sample Name   : Zeolit                        Comment : ZSA - 1
Date & Time   : 11-17-05 10:49:15
Condition
  X-ray Tube : Cu(1.54060 A)    Voltage : 40.0 kV    Current : 30.0 mA
  Scan Range : 3.0000 <-> 70.0000 deg    Step Size : 0.0500 deg
  Count Time : 0.60 sec    Slit  DS : 1.00 deg  SS : 1.00 deg  RS : 0.30 mm
```



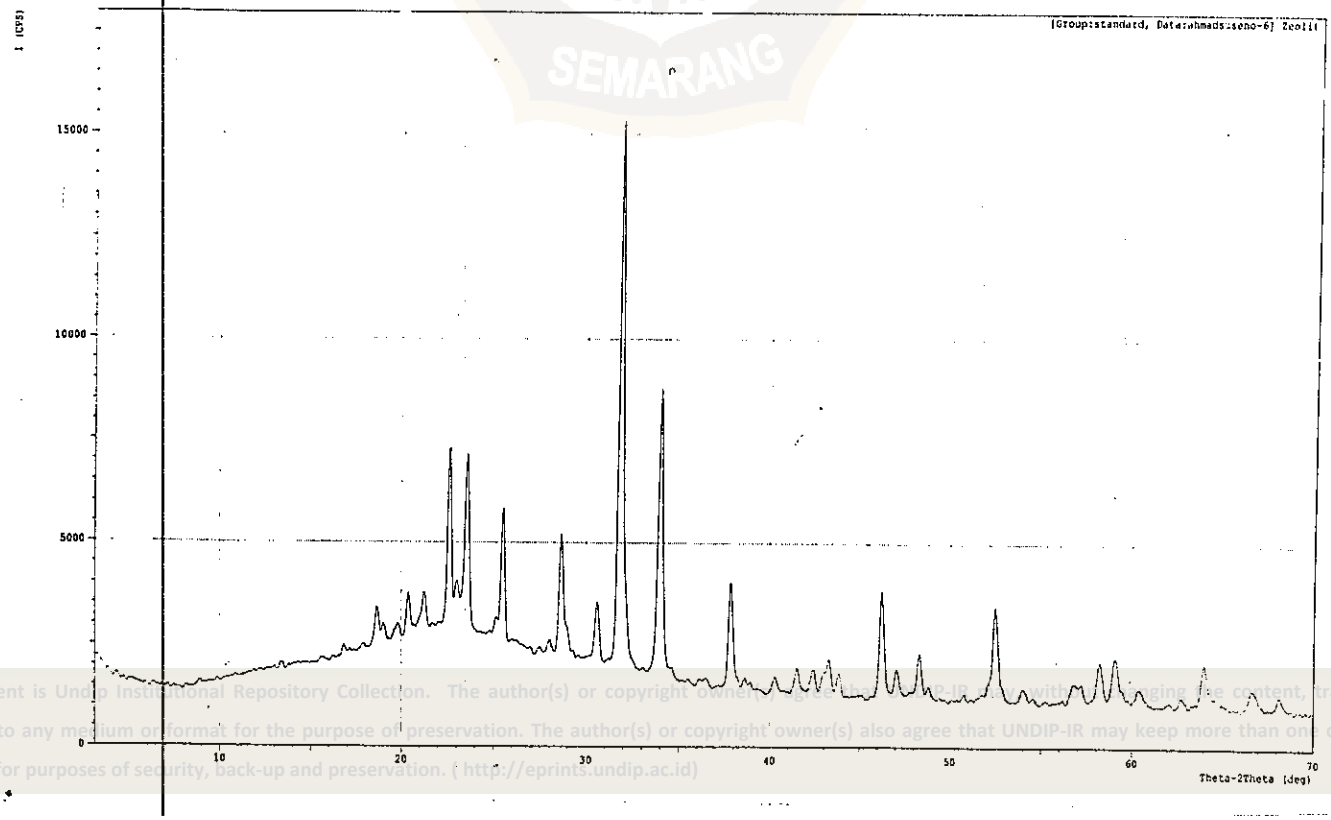
*** Multi Plot ***

File Name : standard\ahmadsuseno-5
Sample Name : Zeolit Comment : ZSA - 2
Date & Time : 11-17-05 11:11:54
Condition
X-ray Tube : Cu(1.54060 A) Voltage : 40.0 kV Current : 30.0 mA
Scan Range : 3.0000 <-> 70.0000 deg Step Size : 0.0500 deg
Count Time : 0.60 sec Slit DS : 1.00 deg SS : 1.00 deg RS : 0.30 mm



*** Multi Plot ***

File Name : standard\ahmadsuseno-6
Sample Name : Zeolit Comment : ZSA - 3
Date & Time : 11-17-05 11:29:07
Condition
X-ray Tube : Cu(1.54060 A) Voltage : 40.0 kV Current : 30.0 mA
Scan Range : 3.0000 <-> 70.0000 deg Step Size : 0.0500 deg
Count Time : 0.60 sec Slit DS : 1.00 deg SS : 1.00 deg RS : 0.30 mm



Lampiran H. Hasil analisis ukuran pori dengan metode adsorpsi gas (BET)

H.1 Hasil analisis ukuran pori zeolit alam

Quantachrome Corporation
NOVA Data Analysis Package Ver. 2.00
File Name = zeoalam

User ID	= Ahmad Suseno	User Setup	= 8
Sample ID	= ZA	Sample Cell Number	= 4
Sample Weight	= 0.3762 g	Sample Volume	= 0.3762 cc
Sample Density	= 1.0000 g/cc		
Po Type	= User	Po	= 748.91 mm Hg
Adsorbate	= Nitrogen	Bath Temperature	= 77.40 deg K
Adsorption Tolerance	= 0.1000 mm Hg	Desorption Tolerance	= 0.1000 mm Hg
Adsorption Equil Time	= 60 sec	Desorption Equil Time	= 60 sec
Adsorption Dwell Time	= 180 sec	Desorption Dwell Time	= 180 sec
Analysis Start Time	= Thu Nov 11 12:29:17 2004	Analysis End Time	= Thu Nov 11 12:29:17 2004

Multi BET (Adsorption)

P/Po	BET Transform (1/(W[Po/P - 1]))
0.095417	10.209135
0.146506	15.660437
0.198704	20.834660
0.249099	25.763522

Slope = 101.001854
Intercept = 0.701038
Correlation Coefficient = 0.999790
BET C = 145.074821

Surface Area = 12.881863 sq m
Specific Surface Area = 34.242060 sq m/g

User ID	= Ahmad Suseno	User Setup	= 8
Sample ID	= ZA	Sample Cell Number	= 4
Sample Weight	= 0.3762 g	Sample Volume	= 0.3762 cc
Sample Density	= 1.0000 g/cc		
Po Type	= User	Po	= 748.91 mm Hg
Adsorbate	= Nitrogen	Bath Temperature	= 77.40 deg K
Adsorption Tolerance	= 0.1000 mm Hg	Desorption Tolerance	= 0.1000 mm Hg
Adsorption Equil Time	= 60 sec	Desorption Equil Time	= 60 sec
Adsorption Dwell Time	= 180 sec	Desorption Dwell Time	= 180 sec
Analysis Start Time	= Sat Nov 20 16:33:26 2004	Analysis End Time	= Sat Nov 20 16:33:26 2004

DVR (Adsorption)

Pore Radius A (Ang)	Pore Area (sq m/A/g e-03)	Pore Volume (cc/A/g e-03)
625.780315	.025849	0.000809
165.919403	0.796915	0.006611
113.549091	3.442436	0.019544
79.278223	9.983838	0.039573
53.046706	11.975763	0.037752
52.885598	25.129049	0.066448
44.783642	507.479	0.113604
39.181859	78.348513	0.153490
34.267192	105.199811	0.180245
31.366405	148.444781	0.232809
28.523242	222.252593	0.316968
25.852169	718.378247	0.928582
23.731737	292.061557	0.346556
21.627754	283.330546	0.306390
20.027475	365.430371	0.365932
18.798993	519.178829	0.581997
17.409522	799.162083	0.695834
16.046101	1009.71434	0.810305
15.011854	1180.263301	0.885897

Total Pore Volume is 26.360646 e-03 cc/g for all pores less than 1026.927978 Angstrom

Average pore radius is 16.195622 Angstrom

H.2 Hasil analisis ukuran pori material hasil modifikasi zeolit alam dengan rasio Si/Al 13,91 (ZSA-1)

Quantachrome Corporation
NOVA Data Analysis Package Ver. 2.00
File Name = zk-5a.dat

User ID	= Seno	User Setup	= 5
Sample ID	= zk - 5	Sample Cell Number	= 2
Sample Weight	= 0.3820 g	Sample Volume	= 0.3820 cc
Sample Density	= 1.0000 g/cc		
Po Type	= User	Po	= 745.32 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	= Tue Nov 15 13:55:09 2005	Analysis End Time	= Tue Nov 15 14:48:32 2005

Multi BET (Adsorption)

P/Po	BET Transform [1/(W[Po/P-1])]
0.044072	11.726456
0.066974	14.182246
0.145739	20.363260
0.200582	26.074450
0.251359	28.530413

Slope	= 82.844585
Intercept	= 8.432543
Correlation Coefficient	= 0.995826
BET C	= 10.824390
Surface Area	= 14.574531 sq m
Specific Surface Area	= 38.153222 sq m/g

Quantachrome Corporation
NOVA Data Analysis Package Ver. 2.00
File Name = zk-5a.dat

User ID	= Seno	User Setup	= 5
Sample ID	= zk - 5	Sample Cell Number	= 2
Sample Weight	= 0.3820 g	Sample Volume	= 0.3820 cc
Sample Density	= 1.0000 g/cc		
Po Type	= User	Po	= 745.32 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	= Tue Nov 15 13:55:09 2005	Analysis End Time	= Tue Nov 15 14:48:32 2005

DVR (Adsorption)

Pore Radius (Ang)	Pore Area (sq m/Å/g e-03)	Pore Volume (cc/Å/g e-03)
389.364826	0.266933	0.005197
179.211270	0.902052	0.008083
102.635303	14.202615	0.072884
73.924604	30.319906	0.112069
59.799417	18.052271	0.053976
49.114567	153.189605	0.376192
42.227294	1.728153	0.003649
36.619653	912.848918	1.867141

Total Pore Volume is 46.540306 e-03 cc/g for all pores less than 522.332907 Angstrom.

Average pore radius is 24.396527 Angstroms

H.3 Hasil analisis ukuran pori material hasil modifikasi zeolit alam dengan rasio Si/Al 24,57 (ZSA-2)

Quantachrome Corporation
NOVA Data Analysis Package Ver. 2.00
File Name = zk-6.dat

User ID	= Seno	User Setup	= 5
Sample ID	= zk - 6	Sample Cell Number	= 2
Sample Weight	= 0.1960 g	Sample Volume	= 0.1960 cc
Sample Density	= 1.0000 g/cc		
Po Type	= User	Po	= 745.51 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	= Fri Nov 18 13:00:54 2005	Analysis End Time	= Fri Nov 18 13:56:06 2005

Multi BET (Adsorption)

P/Po	BET Transform (1/(W[(Po/P)-1]))
0.045314	15.959250
0.067749	17.100071
0.145780	23.148250
0.200584	26.450595
0.251130	29.356708

Slope = 66.702967
Intercept = 12.923723
Correlation Coefficient = 0.998179
BET C = 6.161281

Surface Area = 8.572166 sq m
Specific Surface Area = 43.735543 sq m/g

Quantachrome Corporation
NOVA Data Analysis Package Ver. 2.00
File Name = zk-6.dat

User ID	= Seno	User Setup	= 5
Sample ID	= zk - 6	Sample Cell Number	= 2
Sample Weight	= 0.1960 g	Sample Volume	= 0.1960 cc
Sample Density	= 1.0000 g/cc		
Po Type	= User	Po	= 745.51 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	= Fri Nov 18 13:00:54 2005	Analysis End Time	= Fri Nov 18 13:56:06 2005

DVR (Adsorption)

Pore Radius (Ang)	Pore Area (sq m/Å/g e-03)	Pore Volume (cc/Å/g e-03)
837.087954	0.069577	0.002912
165.278605	2.553281	0.021100
99.471482	1.733387	0.008621
75.314805	44.650695	0.168143
58.916858	146.097010	0.430379
49.364912	14.038307	0.034650
41.892113	588.700529	1.233095
36.785670	28.709983	0.052806
32.453350	1311.712035	2.128472
29.202195	534.526139	0.780467
26.370775	1285.323547	1.694749
24.049461	1843.440693	2.216688
21.954583	4409.270361	4.840185
20.332405	5131.462389	5.216749

Total Pore Volume is 59.183609 e-03 cc/g for all pores less than 1422.936516 Angstrom.

Average pore radius is 27.064307 Angstrom.

H.4 Hasil analisis ukuran pori material hasil modifikasi zeolit alam dengan rasio Si/Al 35,22 (ZSA-3)

Quantachrome Corporation
NOVA Data Analysis Package Ver. 2.00
File Name = zk-2.dat

User ID	= Seno	User Setup	= 5
Sample ID	= zk2	Sample Cell Number	= 4
Sample Weight	= 0.3287 g	Sample Volume	= 0.3287 cc
Sample Density	= 1.0000 g/cc		
Po Type	= User	Po	= 746.52 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	= Tue Nov 15 11:46:45 2005	Analysis End Time	= Tue Nov 15 12:36:02 2005

Multi BET (Adsorption)

P/Po	BET Transform (1/(W[Po/P - 1]))
0.049887	15.496385
0.071726	17.380423
0.149521	24.429459
0.203068	30.541477
0.253320	33.913790

Slope	= 93.047631
Intercept	= 10.813467
Correlation Coefficient	= 0.998019
BET C	= 9.604792
Surface Area	= 11.021482 sq m
Specific Surface Area	= 33.530519 sq m/g

Quantachrome Corporation
NOVA Data Analysis Package Ver. 2.00
File Name = zk-2.dat

User ID	= Seno	User Setup	= 5
Sample ID	= zk2	Sample Cell Number	= 4
Sample Weight	= 0.3287 g	Sample Volume	= 0.3287 cc
Sample Density	= 1.0000 g/cc		
Po Type	= User	Po	= 746.52 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	= Tue Nov 15 11:46:45 2005	Analysis End Time	= Tue Nov 15 12:36:02 2005

DVR (Adsorption)

Pore Radius (Ang)	Pore Area (sq m/A/g e-03)	Pore Volume (cc/A/g e-03)
416.174070	0.220703	0.004593
175.297970	0.903125	0.007916
101.788770	22.465745	0.114338
76.475040	8.219606	0.031430
59.606078	30.313982	0.090345
49.646023	147.778748	0.366831
41.299286	74.001093	0.152810
36.942657	131.890715	0.243620
32.627489	365.709330	0.596609
28.691503	227.163753	0.325883
26.444408	1240.924315	1.640775

Total Pore Volume is 38.574423 e-03 cc/g for all pores less than 572.559347 Angstrom.

Average pore radius is 23.008545 Angstrom.