# LAMPIRAN

Lampiran 1. Perhitungan

a. Ratio Si/Al zeolit

Diketahui :

$SiO_2$ = 66,71 %

$Al_2O_3$ = 6,39 %

Berat sample = 100 mg

1. $\frac{ArSi}{MrSiO_2} x\,\%SiO_2$ x berat sampel = Berat Si dalam $SiO_2$

$$\frac{28}{60} x\,66{,}71\% x\,100mg = 31{,}1313mg$$

$$mmol\ Si = \frac{berat\ Si}{ArSi} = \frac{31{,}1313\ mg}{28} = 1{,}1118\ mmol$$

2. $\frac{2\ ArAl}{MrAl_2O_3} x\,\%Al_2O_3$ x berat sampel = Berat Al dalam $Al_2O_3$

$$\frac{54}{102} x\,6{,}39\,x\,100\ mg = 3{,}3829\ mg$$

$$\text{mmol Al} = \frac{\text{berat Al}}{2\ \text{ArAl}} = \frac{3{,}3829}{54} = 0{,}06264\ \text{mmol}$$

$$RatioSi/Al = \frac{1{,}1118\ mmol}{0{,}06264\ mmol} = 17{,}75$$

b. Penentuan Tegangan Permukaan

$$\gamma = \text{r.g.h. } \rho./\ 2$$

$\gamma$ = tegangan permukaan.

r = jari-jari pipa kapiler.

g = gaya grafitasi.

h = tinggi cairan dalam pipa kapiler.

ρ = massa jenis zat.

Diketahui :

$\rho_{air}$ = 1,00633 gr $ml^{-1}$

$\rho_{ABS}$ = 1,0065 gr $ml^{-1}$

$\rho_{Na\text{-}stearat}$ = 0,999 gr $ml^{-1}$

$h_{air}$ = 2,4 cm

$\gamma_{air}$ = 72 dyne $cm^{-1}$

1. Jari-jari pipa kapiler.

$$r = \frac{\gamma_{air}.2}{h_{air}.\rho_{air}.g}$$

$$= \frac{2.72 dyne/cm}{980 cm/s.2{,}6 cm.1{,}0063 gr/ml} = 0{,}0565 cm$$

2. Tegangan permukaan ABS

$$\gamma = \frac{r.g.\rho_{ABS}.h_{ABS}}{2}$$

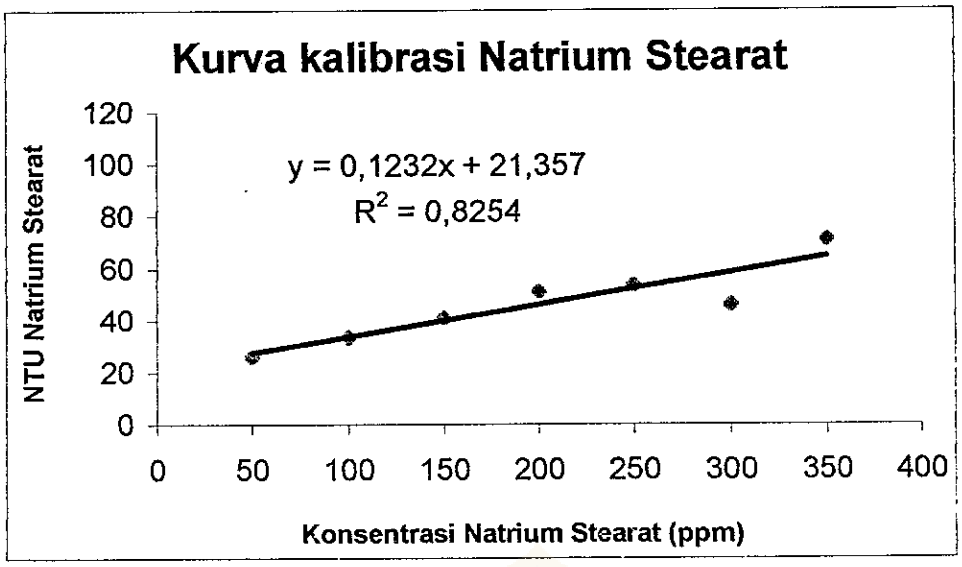
$$\gamma_{ABS} = \frac{0{,}0565\ cm.980\ cm\ s^{-1}.1{,}0065\ gr\ ml^{-1}.2{,}3\ cm}{2} = 69{,}66\ dyne\ cm^{-1}$$

3. Tegangan permukaan Na-stearat.

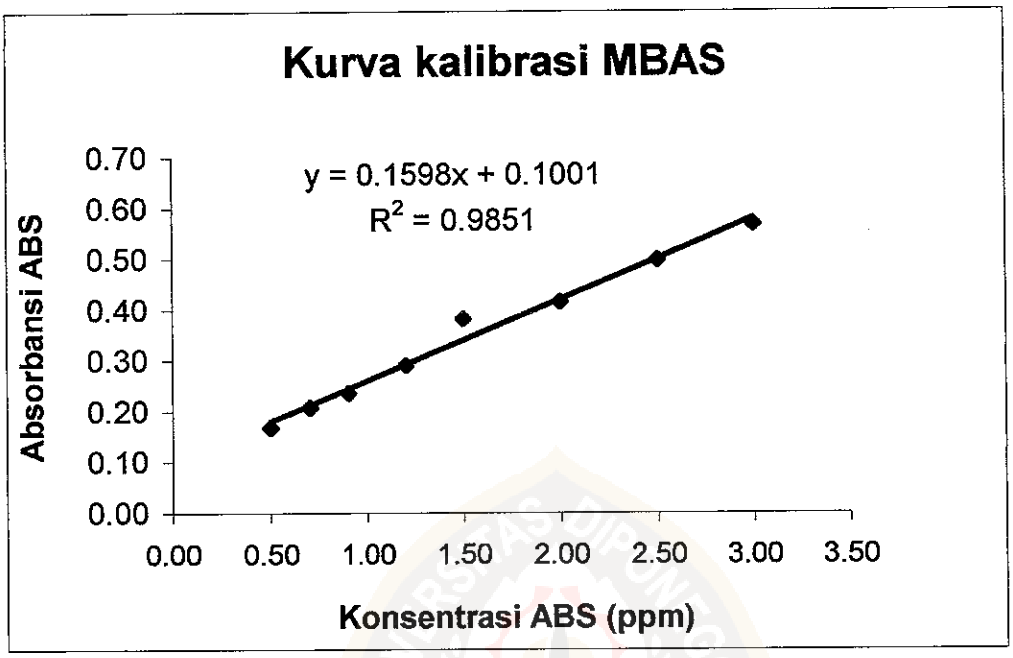
$$\gamma = \frac{r.g.\rho_{Na\text{-}stearat}.h_{Na\text{-}steaerat}}{2}$$

$$\gamma_{Na-stearat} = \frac{0{,}0565\ cm.980.\ cm\ s^{-1}.0{,}999\ gr\ ml^{-1}.2{,}3\ cm}{2} = 69{,}651\ dyne\ cm^{-1}$$

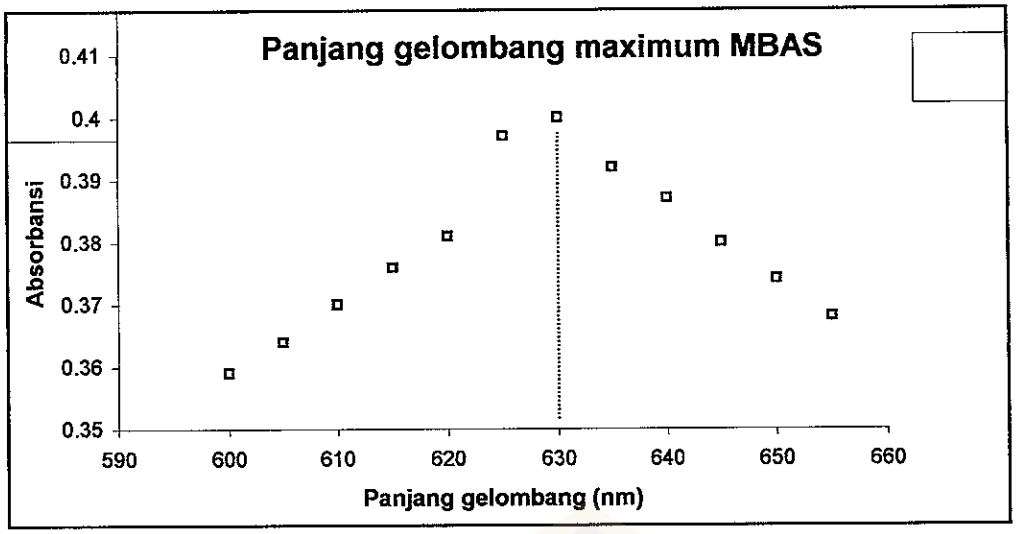
Lampiran 2. Grafik Kurva Kalibrasi Natrium stearat



Lampiran 3. Grafik Kurva Kalibrasi MBAS



Lampiran 4. Grafik Panjang Gelombang Maximum MBAS



Lampiran 5. Tabel Absorbansi MBAS Sebelum dan Sesudah Adsorpsi

a. Tabel absorbansi MBAS, pengaruh konsentrasi ABS terhadap kapasitas adsorpsi zeolit.

| No | $C_{[ABS]o}$ | $A_o$ | $A_s$ |
|---|---|---|---|
| 1 | 0,5 | 0,167 | 0,165 |
| 2 | 1,0 | 0,325 | 0,296 |
| 3 | 1,5 | 0,384 | 0,336 |
| 4 | 2,0 | 0,416 | 0,372 |
| 5 | 2,5 | 0,467 | 0,322 |
| 6 | 3,0 | 0,516 | 0,362 |

Keterangan :

$A_0$ : Absorbansi MBAS untuk larutan surfaktan mula-mula.

$A_s$ : Absorbansi MBAS untuk larutan surfaktan sisa adsorbsi.

b. Tabel absorbansi MBAS, pengaruh waktu kontak adsorpsi ABS terhadap kapasitas adsorpsi zeolit.

| No | T (menit) | $A_o$ | $A_s$ |
|---|---|---|---|
| 1 | 20 | 0,416 | 0,399 |
| 2 | 40 | 0,416 | 0,381 |
| 3 | 60 | 0,416 | 0,356 |
| 4 | 80 | 0,416 | 0,365 |
| 5 | 100 | 0,416 | 0,376 |

Lampiran 6. Tabel NTU Natrium stearat Sebelum dan Sesudah Adsorbsi

a. Tabel NTU Natrium stearat, pengaruh konsentrasi Natrium stearat terhadap kapasitas adsorpsi zeolit.

| No | $C_{[Natrium\ stearat]o}$ | $NTU_0$ | $NTU_s$ |
|---|---|---|---|
| 1 | 25 | 23,5 | 13,5 |
| 2 | 50 | 33,5 | 26 |
| 3 | 75 | 38,5 | 16 |
| 4 | 100 | 46 | 23,5 |
| 5 | 125 | 58,5 | 46 |
| 6 | 150 | 70 | 58 |

Keterangan :

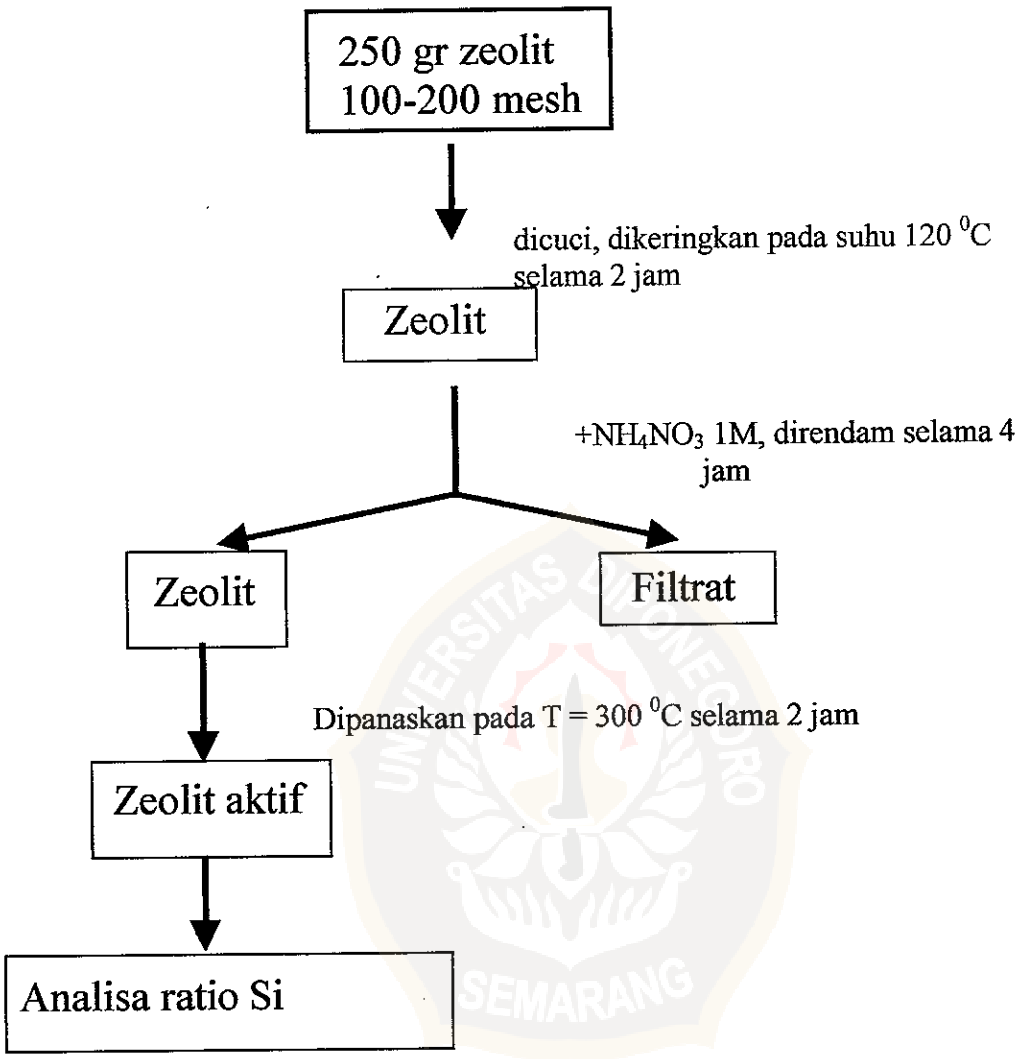
$NTU_o$ : NTU larutan Natrium stearat awal.

$NTU_s$ : NTU Larutan Natrium stearat sisa adsorbsi.

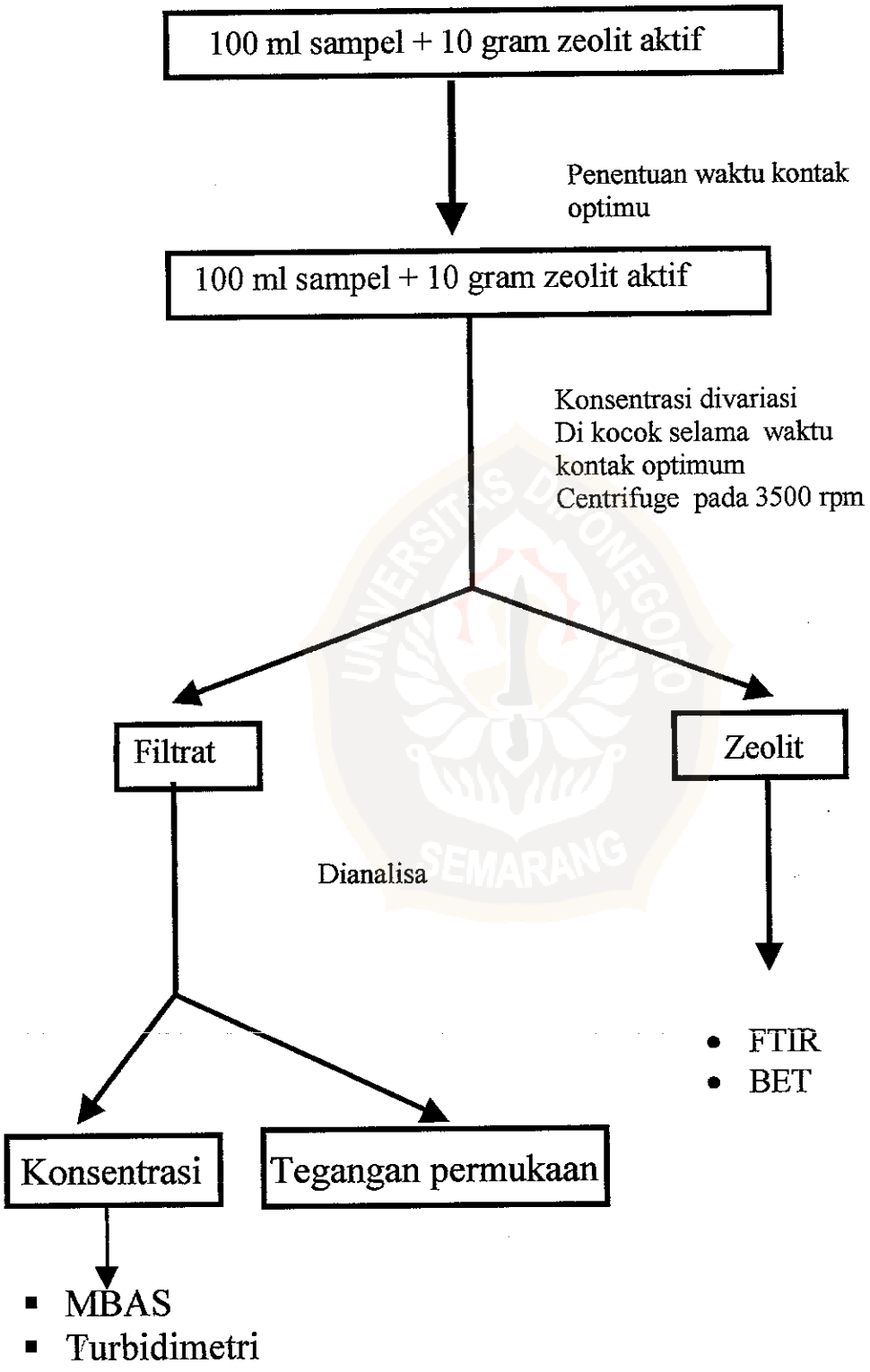
b. Tabel NTU Natrium stearat, pengaruh waktu kontak optimum Natrium stearat terhadap kapasitas adsorpsi zeolit.

| No | T (menit) | $NTU_o$ | $NTU_s$ |
|---|---|---|---|
| 1 | 5 | 91 | 99 |
| 2 | 10 | 91 | 71 |
| 3 | 20 | 91 | 63,5 |
| 4 | 30 | 91 | 74 |
| 5 | 40 | 91 | 81 |

Lampiran 7. Skema Kerja Dealuminasi Zeolit



Lampiran 8. Skema kerja Adsorbsi Surfaktan Anionik oleh Zeolit Terdealuminasi



Lampiran 9. Hasil analisa luas permukaan spesifik zeolit

Quantachrome Corporation
NOVA Data Analysis Package Ver. 2.00
File Name = nur-1.dat

| | | | |
|---|---|---|---|
| User ID | = Nurul Ana | User Setup | = 2 |
| Sample ID | = Zeolit Cipatujah | Sample Cell Number | = 4 |
| Sample Weight | = 0.2118 g | Sample Volume | = 0.2118 cc |
| Sample Density | = 1.0000 g/cc | | |
| Po Type | = User | Po | = 751.53 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 | = 150 sec | Desorption Dwell Time | = 0 sec |
| Analysis Start Time | = Fri May 04 03:55:27 2001 | Analysis End Time | = Fri May 04 04:57:51 2001 |

Multi BET (Adsorption)

| P/Po | BET Transform (1/{W[Po/P - 1]}) |
|---|---|
| 0.101731 | 10.156910 |
| 0.150902 | 14.600602 |
| 0.201431 | 19.860502 |

| | | |
|---|---|---|
| Slope | = | 97.359275 |
| Intercept | = | 0.136889 |
| Correlation Coefficient | = | 0.999173 |
| BET C | = | 712.226204 |
| Surface Area | = | 7.565467 sq m |
| Specific Surface Area | = | 35.719524 sq m/g |

Data Nova Luas Permukaan Zeolit Cipatujah Terdealuminasi

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

| | | | |
|---|---|---|---|
| ser ID | = Nurul Ana | User Setup | = 2 |
| ample ID | = Zeolit ads. | Sample Cell Number | = 4 |
| ample Weight | = 0.2757 g | Sample Volume | = 0.2757 cc |
| ample Density | = 1.0000 g/cc | | |
| o Type | = User | Po | = 751.33 mm Hg |
| dsorbate | = N2 | Bath Temperature | = 77.40 deg K |
| dsorption Tolerance | = 0.1000 mm Hg | Desorption Tolerance | = 0.0000 mm Hg |
| dsorption Equil Time | = 60 sec | Desorption Equil Time | = 0 sec |
| dsorption Dwell Time | = 150 sec | Desorption Dwell Time | = 0 sec |
| nalysis Start Time | = Tue May 08 02:05:40 2001 | Analysis End Time | = Tue May 08 03:06:18 2001 |

Multi BET (Adsorption)

| P/Po | BET Transform (1/{W[Po/P - 1]}) |
|---|---|
| 0.096777 | 11.325624 |
| 0.149740 | 17.219003 |
| 0.200906 | 23.419453 |

| | | |
|---|---|---|
| Slope | = | 116.114547 |
| Intercept | = | 0.003935 |
| Correlation Coefficient | = | 0.999697 |
| BET C | = | 29507.822218 |
| Surface Area | = | 8.269405 sq m |
| Specific Surface Area | = | 29.991062 sq m/g |

Data Nova Luas Permukaan Zeolit aktif setelah teradsorbsi ABS

Quantachrome Corporation
NOVA Data Analysis Package Ver. 2.00
File Name = nur-3.dat

| | | | |
|---|---|---|---|
| User ID | = Nurul Ana | User Setup | = 3 |
| Sample ID | = Zeolit + Surfactan | Sample Cell Number | = 4 |
| Sample Weight | = 0.2995 g | Sample Volume | = 0.2995 cc |
| Sample Density | = 1.0000 g/cc | | |
| Po Type | = User | Po | = 750.57 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 Jun 05 10:00:23 2001 | Analysis End Time | = Tue Jun 05 11:06:43 2001 |

Multi BET (Adsorption)

| P/Po | BET Transform (1/{W[Po/P - 1]}) |
|---|---|
| 0.098258 | 23.746294 |
| 0.150435 | 34.865385 |
| 0.200917 | 45.656202 |
| 0.251451 | 56.649750 |

| | | |
|---|---|---|
| Slope | = | 214.675960 |
| Intercept | = | 2.604184 |
| Correlation Coefficient | = | 0.999988 |
| BET C | = | 83.435032 |
| Surface Area | = | 4.800398 sq m |
| Specific Surface Area | = | 16.027772 sq m/g |

Data Nova Luas Permukaan Zeolit aktif setelah teradsorbsi Na-stearat

Lampiran 10. Hasil Analisa AAS

DIREKTORAT JENDERAL GEOLOGI DAN SUMBERDAYA MINERAL

DIREKTORAT VULKANOLOGI

BALAI PENYELIDIKAN DAN PENGEMBANGAN TEKNOLOGI KEGUNUNGAPIAN

Jl. Cendana No.15 Telp.(0274)514180-514192, Fax.563630 Yogyakarta 55166

LABORATORIUM KIMIA

Bentuk Conto : Padatan
Pengirim Conto : Nurul Ana
Asal Conto :
No. Analisa : 07/02/LK/2000

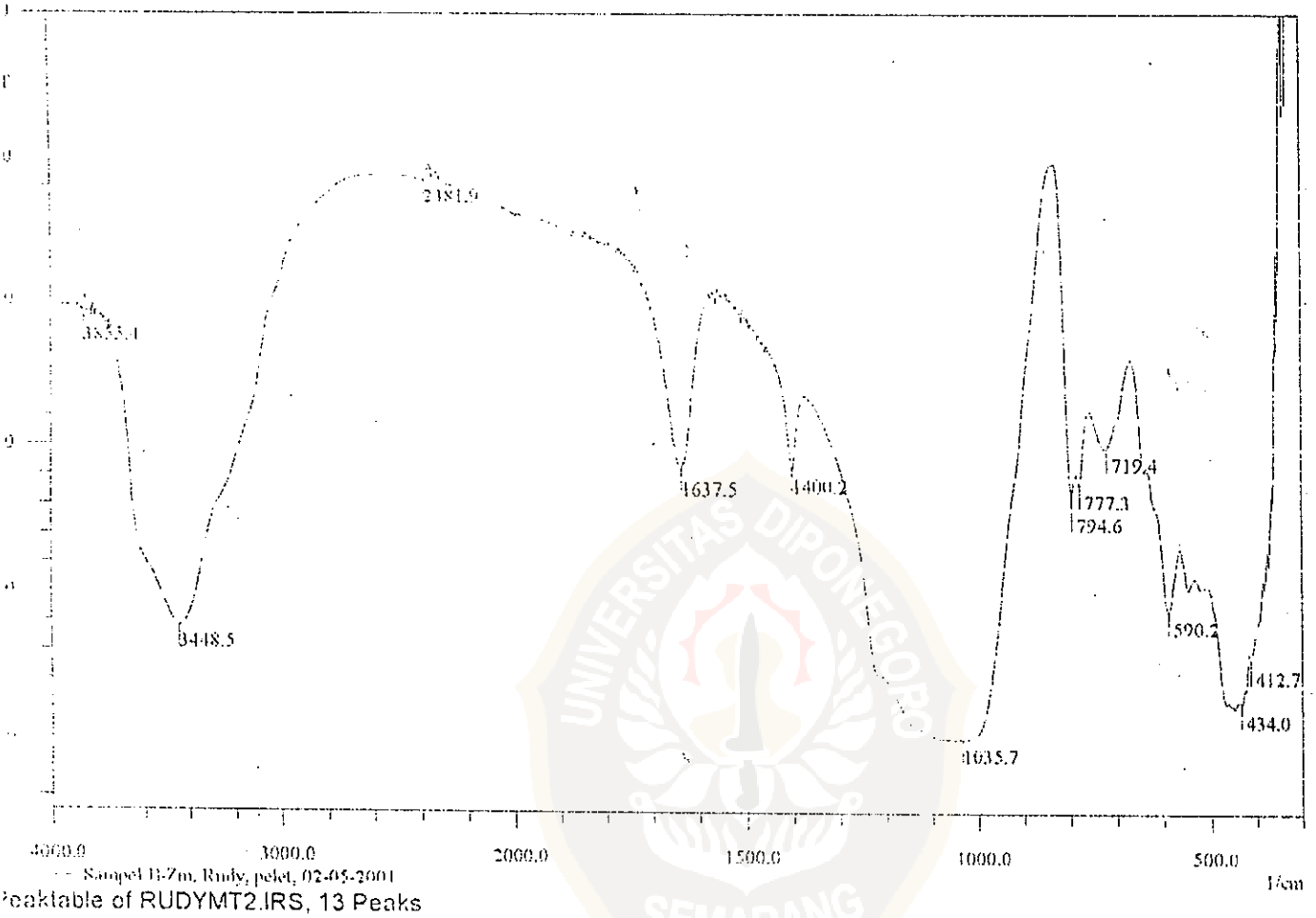
HASIL ANALISIS KIMIA
(Dalam satuan % berat)

| Unsur | NH4-Z | Z |
|---|---|---|
| $Al_2O_3$ | 6,39 | 22,56 |
| $SiO_2$ | 66,71 | |

Yogyakarta, 30 Juli 2000
Lab.Geokimia

Ir. N. Fuis Sutaningsih
NIP. 100010995

Lampiran 11. Spektra FTIR Zeolit Aktif Awal dan sisa Adsorpsi

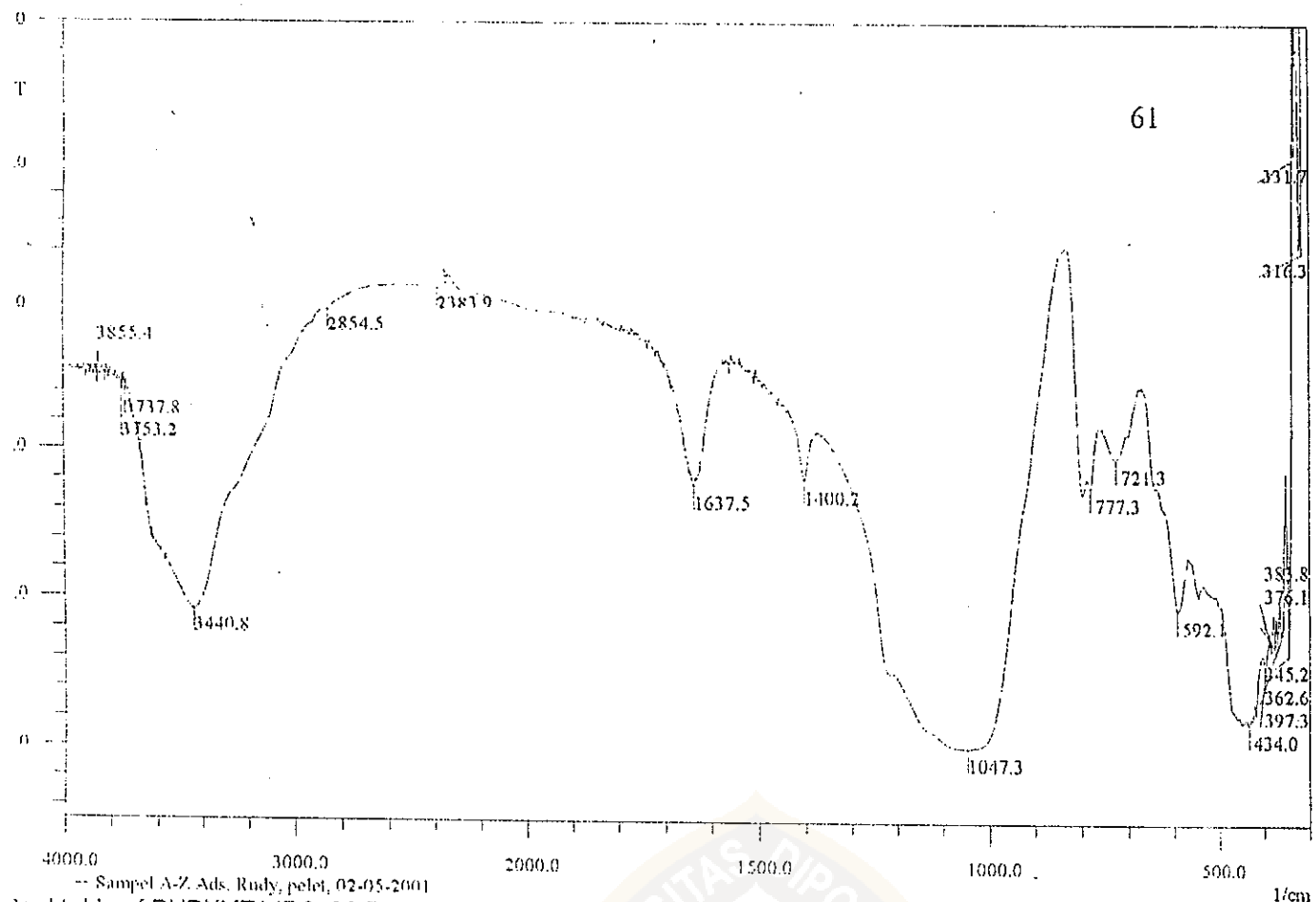



Sampel Ti-Zm, Rudy, pelet, 02-05-2001

Peaktable of RUDYMT2.IRS, 13 Peaks
Threshhold: 80, Noise: 1, No Range Selection

| Nr. | Pos. (1/cm) | Inten. (%T) |
|---|---|---|
| | 324.0 | 70.024 |
| | 412.7 | 5.393 |
| | 434.0 | 2.361 |
| | 590.2 | 8.761 |
| | 719.4 | 19.889 |
| | 777.3 | 17.418 |
| | 794.6 | 16.960 |
| | 1035.7 | 0.045 |
| | 1400.2 | 18.424 |
| 10 | 1637.5 | 18.214 |
| 11 | 2381.9 | 38.486 |
| 12 | 3448.5 | 7.614 |
| 13 | 3855.4 | 28.658 |

Data Spektra FTIR Zeolit Cipatujah Terdealuminasi

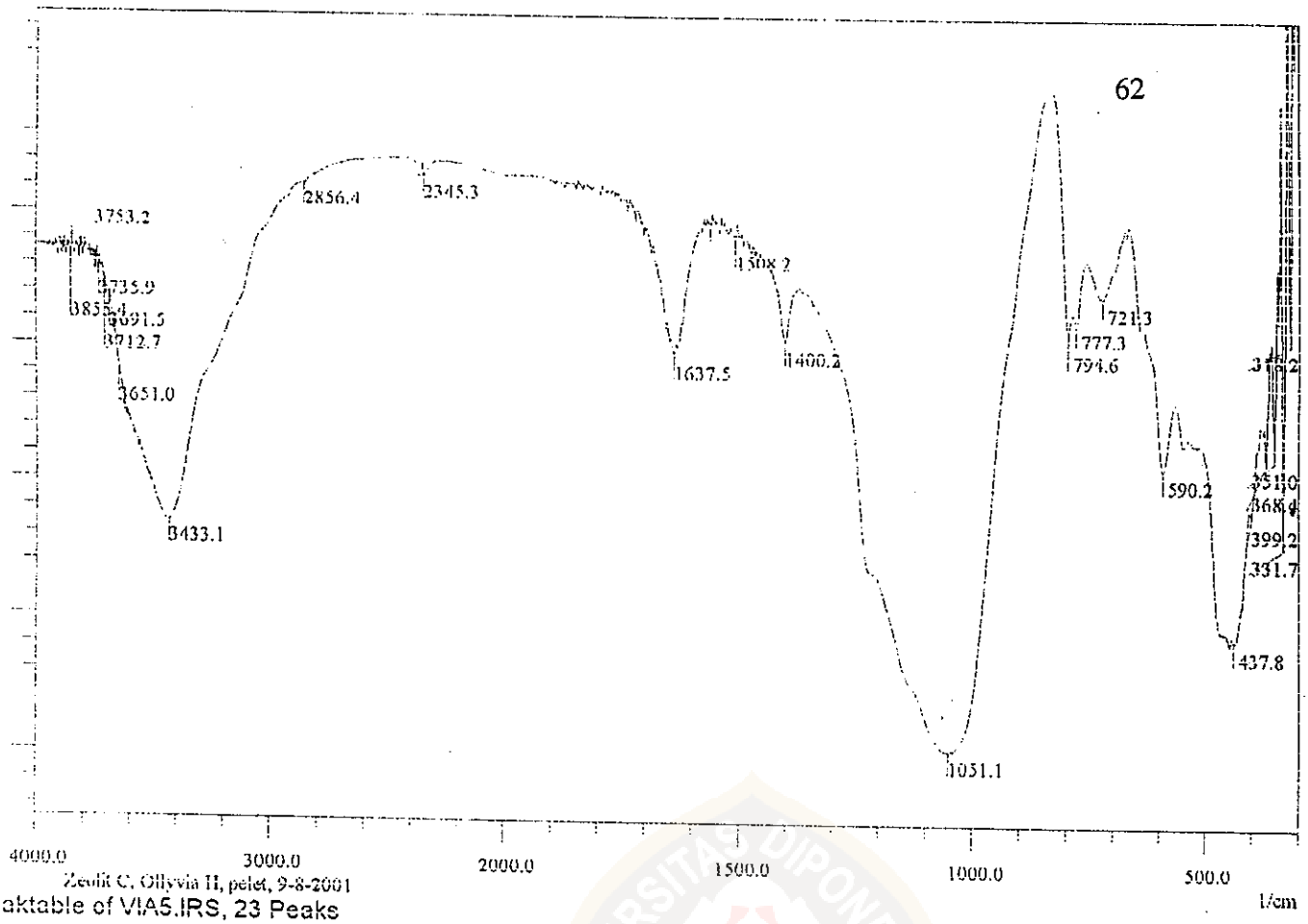



-- Sampel A-Z. Ads. Rudy, pelet, 02-05-2001

Peaktable of RUDYMT1.IRS, 20 Peaks
Threshhold: 80, Noise: 1, No Range Selection

| Nr. | Pos. (1/cm) | Inten. (%T) |
|---|---|---|
| | 316.3 | 34.010 |
| 2 | 331.7 | 40.686 |
| 3 | 345.2 | 6.365 |
| 4 | 362.6 | 7.570 |
| 5 | 376.1 | 6.902 |
| 6 | 383.8 | 6.651 |
| 7 | 397.3 | 5.280 |
| 8 | 434.0 | 1.691 |
| 9 | 592.1 | 9.300 |
| 10 | 721.3 | 19.489 |
| 11 | 777.3 | 17.564 |
| 12 | 1047.3 | 0.038 |
| 13 | 1400.2 | 17.987 |
| 14 | 1637.5 | 17.603 |
| 15 | 2383.9 | 31.361 |
| 16 | 2854.5 | 29.800 |
| 17 | 3440.8 | 9.157 |
| 18 | 3737.8 | 23.795 |
| 19 | 3753.2 | 23.879 |
| 20 | 3855.4 | 24.340 |

Data Spektra FTIR Zeolit aktif teradsorpsi ABS




Zeolit C, Ollyvia II, pelet, 9-8-2001

aktable of VIAS.IRS, 23 Peaks

reshhold: 80, Noise: 1, No Range Selection

| Pos. (1/cm) | Inten. (%T) |
|---|---|
| 318.2 | 30.643 |
| 331.7 | 15.583 |
| 351.0 | 21.933 |
| 368.4 | 21.802 |
| 399.2 | 17.749 |
| 437.8 | 8.751 |
| 590.2 | 21.261 |
| 721.3 | 33.992 |
| 777.3 | 32.067 |
| 794.6 | 31.591 |
| 1051.1 | 0.526 |
| 1400.2 | 30.505 |
| 1508.2 | 37.673 |
| 1637.5 | 29.349 |
| 2345.3 | 42.776 |
| 2856.4 | 42.216 |
| 3433.1 | 16.887 |
| 3651.0 | 27.193 |
| 3691.5 | 32.786 |
| 3712.7 | 33.970 |
| 3735.9 | 35.160 |
| 3753.2 | 35.363 |
| 3855.4 | 35.612 |

Data Spektra FTIR Zeolit aktif teradsorpsi Na-stearat

Lampiran 12. Hasil Analisa Na yang Teradsorpsi pada Zeolit Aktif Awal dan Sisa Adsorpsi.

HASIL SEMENTARA ANALISA LOGAM Na PI.356-358

| NO. | NO. ANALISA/ KODE CONTOH | BERAT CONTOH (g) | HASIL AAS (mg/L) | HASIL PERHITUNGAN (mg/Kg) |
|---|---|---|---|---|
| 1. | PI. 356 / 2A | 2,0110 | 40,534 | 2015,6 |
| 2. | PI. 357 / 2B | 1,5575 | 36,017 | 2312,5 |
| 3. | PI. 358 / 2C | 2,0054 | 40,578 | 2023,4 |

Keterangan: Contoh padatan dilarutkan hingga volume 100 mL.

22/8 01