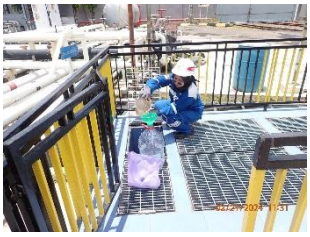
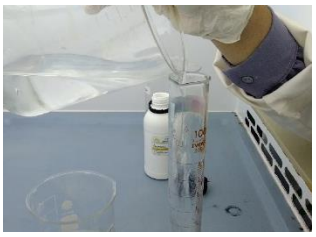
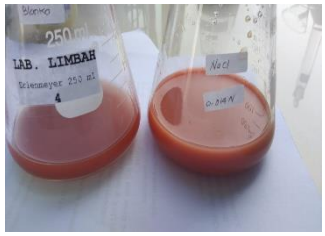
LAMPIRAN

LAMPIRAN I. DOKUMENTASI TUGAS AKHIR

 Mengambil limbah daun glodokan tiang	 Mengambil air limbah	 Menghaluskan daun glodokan tiang
 Menimbang bahan	 Menimbang NaOH	 Melarutkan NaOH
 Proses delignifikasi	 Hasil delignifikasi	 Mengukur larutan ammonia

 Mengukur larutan isopropanol	 Mengukur aquades	 Penambahan larutan TEOS
 Proses pembentukan pelapis	 Hasil dari pembentukan pelapis	 Perendaman dengan etanol
 Menimbang sampel untuk proses selulosa	 Memasukkan sampel pada corong sampel	 Proses refluks pada proses selulosa
 Menambahkan larutan H_2SO_4	 Menimbang kertas saring	 Menyaring sampel

		
Menimbang hasil selulosa	Proses analisis hydrofobisitas	Analisis pH
		
Analisis ammonia	Analisis residu klorin	Analisis minyak dan lemak

LAMPIRAN II. PERHITUNGAN

- **Rumus Konsentrasi NaOH 3% diencerkan dengan 1 Liter aquadest**

  $\frac{3}{100}$ x 1000 ml = 30 gram

- **Rumus Pengenceran Konsentrasi Amonia**

Ammonia 90% → 6%	**Ammonia 90% → 8%**
$M_1 \times V_1 = M_2 \times V_2$	$M_1 \times V_1 = M_2 \times V_2$
6% x 1000 ml = 90% x V_2	8% x 1000 ml = 90% x V_2
60 = 90% x V_2	80 = 90% x V_2
$V_2 = \frac{60}{90\%}$ = 66,7 ml	$V_2 = \frac{80}{90\%}$ = 88,9 ml

- **Rumus Konsentrasi Etanol**

Etanol 96% → 2%	**Etanol 96% → 4%**
$M_1 \times V_1 = M_2 \times V_2$	$M_1 \times V_1 = M_2 \times V_2$
2% x 1000 ml = 96% x V_2	4% x 1000 ml = 96% x V_2
20 = 96% x V_2	40 = 96% x V_2
$V_2 = \frac{20}{96\%}$ = 20,8 ml	$V_2 = \frac{40}{96\%}$ = 41,6 ml

- **Rumus Konsentrasi Isopropanol**

Isopropanol 40%	**Isopropanol 50%**
$\frac{40}{100}$ x 1000 ml = 400 ml	$\frac{50}{100}$ x 1000 ml = 500 ml

- **Rumus H_2SO_4 0,5M dalam pengenceran menggunakan aquadest sebanyak 1000 ml**

  Diketahui

  c = 98%

  ρ = 1,84 g/ml

  Mr = 98 g/mol

$$M = \frac{10 \times \% \times \rho}{Mr}$$

$$= \frac{10 \times 98 \times 1{,}84\ {}^{g}/_{ml}}{98\ {}^{g}/_{mol}}$$

$$= \frac{1.803{,}2}{98}$$

$$= 18{,}4\ M$$

Pengenceran H_2SO_4 0,5 M

$M_1 \times V_1 = M_2 \times V_2$

$18{,}4M \times V_1 = 0{,}5M \times 500ml$

$$V_1 = \frac{250\ ml}{18{,}4}$$

$= 13{,}6\ ml$

PERHITUNGAN ANALISIS HIDROFOBISITAS

Ammonia 6%, Isopropanol 40%, Etanol 2%

Daya serap air = $\frac{W-Wo}{W} \times 100\ \%$

$= \frac{0{,}5203-0{,}5108}{0{,}5108} \times 100\ \%$

$= \frac{0{,}0095}{0{,}5108} \times 100\ \%$

$= 0{,}0185 \times 100\ \%$

$= 1{,}85\%$

Ammonia 6%, Isopropanol 40%, Etanol 4%

Daya serap air = $\frac{W-Wo}{W} \times 100\ \%$

$= \frac{0{,}5286-0{,}5080}{0{,}5080} \times 100\ \%$

$= \frac{0{,}0206}{0{,}5080} \times 100\ \%$

$= 0{,}04055 \times 100\ \%$

$= 4{,}055\%$

Ammonia 6%, Isopropanol 50%, Etanol 2%

Daya serap air = $\frac{W-Wo}{W} \times 100\ \%$

$= \frac{0{,}5088 - 0{,}5070}{0{,}5070} \times 100\ \%$

$= \frac{0{,}0018}{0{,}5070} \times 100\ \%$

$= 0{,}00355 \times 100\ \%$

$= 0{,}355\%$

Ammonia 6%, Isopropanol 50%, Etanol 4%

Daya serap air = $\frac{W-Wo}{W} \times 100\ \%$

$= \frac{0{,}5244-0{,}5176}{0{,}5176} \times 100\ \%$

$= \frac{0{,}0068}{0{,}5176} \times 100\ \%$

$= 0{,}0131 \times 100\ \%$

$= 1{,}31\%$

Ammonia 8%, Isopropanol 40%, Etanol 2%

Daya serap air = $\frac{W-Wo}{W} \times 100\ \%$

$= \frac{0{,}5132-0{,}5083}{0{,}5083} \times 100\ \%$

$= \frac{0{,}0049}{0{,}5083} \times 100\ \%$

$= 0{,}00962 \times 100\ \%$

$= 0{,}963\%$

Ammonia 8%, Isopropanol 40%, Etanol 4%

Daya serap air = $\frac{W-Wo}{W} \times 100\ \%$

$= \frac{0{,}5015-0{,}5107}{0{,}5107} \times 100\ \%$

$= \frac{0{,}0006}{0{,}5107} \times 100\ \%$

$= 0{,}00119 \times 100\ \%$

$= 0{,}119\%$

Ammonia 8%, Isopropanol 50%, Etanol 2%

Daya serap air = $\frac{W-Wo}{W} \times 100\ \%$

$= \frac{0,5295-0,5113}{0,5113} \times 100\ \%$

$= \frac{0,0182}{0,5113} \times 100\ \%$

$= 0,0355 \times 100\ \%$

$= 3,55\%$

Ammonia 8%, Isopropanol 50%, Etanol 4%

Daya serap air = $\frac{W-Wo}{W} \times 100\ \%$

$= \frac{0,5160-0,5130}{0,530} \times 100\ \%$

$= \frac{0,003}{0,5130} \times 100\ \%$

$= 0,00584 \times 100\ \%$

$= 0,584\%$

PERHITUNGAM KADAR SELULOSA

Kode sampel	Awal sampel biomassa lignoselulosa (a)	Residu sampel refluks dengan air panas (b)	Residu sampel setelah refluk dengan 0,5 M H_2SO_4 (c)	Residu sampel setelah diperlakukan dengan H_2SO_4 72% dan kemudian diencerkan menjadi 0,5M H_2SO_4 (d)	Abu dari residu sampel (e)
A6I40E2	1,0278	0,9619	0,7812	0,2971	0,002
A6I40E4	1,0459	0,9179	0,7528	0,2841	0,002
A6I50E2	1,0512	0,9446	0,7665	0.2651	0,0012
A6I50E4	1,0337	0,9422	0,7356	0,2889	0,0014
A8I40E2	1,0522	0,9615	0,7568	0,2883	0,0015
A8I40E4	1,0265	0,9118	0,7598	0,2861	0,0008
A8I50E2	1,0362	0,8917	0,6836	0,2995	0,0023
A8I50E4	1,0381	0,9532	0,7635	0,2883	0,0013

➢ **Analisis Kadar Hemiselulosa**

A6I40E2

$= \frac{0,9619-0,7812}{1,0278} \; x \; 100\%$

$= \frac{0,1807}{1,0278} \; x \; 100\%$

= 0,1758 x 100%

= 17,58%

A6I40E4

$= \frac{0,9179-0,7528}{1,0459} \; x \; 100\%$

$= \frac{0,1651}{1,0459} \; x \; 100\%$

= 0,1578 x 100%

= 15,78%

A6I50E2

$= \frac{0,9446-0,7665}{1,0512} \; x \; 100\%$

$= \frac{0,1781}{1,0512} \; x \; 100\%$

= 0,1694 x 100%

= 16,94%

A6I50E4

$= \frac{0,9422-0,7354}{1,0337} \; x \; 100\%$

$= \frac{0,2068}{1,0337} \; x \; 100\%$

= 0,2000 x 100%

= 20%

A8I40E2

$= \frac{0,9615-0,7568}{1,0522} \; x \; 100\%$

$= \frac{0,2055}{1,0522} \; x \; 100\%$

= 0,1953 x 100%

= 19,53%

A8I40E4

$= \frac{0,9118-0,7598}{1,0265} \; x \; 100\%$

$= \frac{0,152}{1,0265} \; x \; 100\%$

= 0,1480 x 100%

= 14,8%

A8I50E2

$= \frac{0,8917-0,6836}{1,0362} \; x \; 100\%$

$= \frac{0,2081}{1,0362} \; x \; 100\%$

= 0,2008 x 100%

= 20,08%

A8I50E4

$= \frac{0,9532-0,7635}{1,0381} \; x \; 100\%$

$= \frac{0,1897}{1,0381} \; x \; 100\%$

= 0,1827 x 100%

= 18,27%

➢ **Analisis Kadar Selulosa**

A6I40E2

$= \frac{0,7812-0,2971}{1,0278} \; x \; 100\%$

$= \frac{0,4841}{1,0278} \; x \; 100\%$

= 0,471 x 100%

= 47,1%

A6I40E4

$= \frac{0,7528-0,2841}{1,0459} \; x \; 100\%$

$= \frac{0,4687}{1,0459} \; x \; 100\%$

= 0,4481 x 100%

= 44,81%

A6I50E2

$= \frac{0,7665-0,2651}{1,0512} \; x \; 100\%$

$= \frac{0,5014}{1,0512} \; x \; 100\%$

= 0,4769 x 100%

= 47,69%

A6I50E4

$= \frac{0,7354-0,2889}{1,0337} \; x \; 100\%$

$= \frac{0,4467}{1,0337} \; x \; 100\%$

= 0,4321 x 100%

= 43,21%

A8I40E2

$= \frac{0,7568-0,2883}{1,0522} \; x \; 100\%$

$= \frac{0,4685}{1,0522} \; x \; 100\%$

= 0,4452 x 100%

= 44,52%

A8I40E4

$= \frac{0,7598-0,2861}{1,0265} \; x \; 100\%$

$= \frac{0,4737}{1,0265} \; x \; 100\%$

= 0,4614 x 100%

= 46,14%

A8I50E2

$= \frac{0,6836-0,2995}{1,0362} \; x \; 100\%$

$= \frac{0,3841}{1,0362} \; x \; 100\%$

= 0,3706 x 100%

= 37,06%

A8I50E4

$= \frac{0,7635-0,2883}{1,0381} \; x \; 100\%$

$= \frac{0,4752}{1,0381} \; x \; 100\%$

= 0,4577 x 100%

=45,77 %

➢ **Analisis Kadar Lignin**

A6I40E2

$= \frac{0,2971-0,002}{1,0278}\ x\ 100\%$

$= \frac{0,2951}{1,0278}\ x\ 100\%$

= 0,2871 x 100%

= 28,71%

A6I40E4

$= \frac{0,2841-0,002}{1,0459}\ x\ 100\%$

$= \frac{0,2821}{1,0459}\ x\ 100\%$

= 0,2697 x 100%

= 26,97%

A6I50E2

$= \frac{0,2651-0,2651}{1,0512}\ x\ 100\%$

$= \frac{0,2639}{1,0512}\ x\ 100\%$

= 0,251 x 100%

= 25,1%

A6I50E4

$= \frac{0,2889-0,0014}{1,0337}\ x\ 100\%$

$= \frac{0,2875}{1,0337}\ x\ 100\%$

= 0,2781 x 100%

= 27,81%

A8I40E2

$= \frac{0,2883-0,0015}{1,0522}\ x\ 100\%$

$= \frac{0,2868}{1,0522}\ x\ 100\%$

= 0,2725 x 100%

= 27,25%

A8I40E4

$= \frac{0,2861-0,0008}{1,0265}\ x\ 100\%$

$= \frac{0,2853}{1,0265}\ x\ 100\%$

= 0,2779 x 100%

= 27,79%

A8I50E2

$= \frac{0,2995-0,0023}{1,0362}\ x\ 100\%$

$= \frac{0,2972}{1,0362}\ x\ 100\%$

= 0,2868 x 100%

= 28,68%

A8I50E4

$= \frac{0,2883-0,0013}{1,0381}\ x\ 100\%$

$= \frac{0,287}{1,0381}\ x\ 100\%$

= 0,2764 x 100%

=27,64%

ANALISIS RESIDU KLORIN

Kode Sampel	Titrasi $AgNO_3$ (ml)		
	Titrasi ke-1	Titrasi ke-2	Rata-rata
Limbah Awal	17 ml	17,5ml	17,25ml
A6I50E2 (0,3 gram)	13,4 ml	14,1 ml	13,75 ml
A6I50E2 (0,6 gram)	14,1 ml	15,5ml	14,8 ml
A8I40E4 (0,3 gram)	17 ml	15,3 ml	16,15 ml
A8I40E4 (0,6 gram)	18 ml	15,6 ml	16,8 ml
Blanko	7 ml		

Larutan bahan baku $AgNO_3$ dengan NaCl 0,0141 N

$$N\ AgNO_3 = \frac{V1 \times N1}{VA - VB}$$

Diketahui V_1 = 25 ml

N_1= 0,0141 N

V_A = 32 ml

V_B = 2,4 ml

$$N\ AgNO_3 = \frac{V1 \times N1}{VA - VB}$$

$$= \frac{25\ ml \times 0{,}0141\ N}{32\ ml - 2{,}4}$$

$$= \frac{25\ ml \times 0{,}141\ N}{29{,}6\ ml}$$

$$= \frac{0{,}3525\ N}{29{,}6}$$

= 0,0119 N

PERHITUNGAN KADAR RESIDU KLORIN

Kadar Cl (mg/L) = $\frac{(\mathbf{A-B})\times \mathbf{N} \times 35{,}40}{\mathbf{V}}$

Diketahui A= $AgNO_3$ titrasi contoh uji

B= $AgNO_3$ titrasi blanko

N= Normalitas larutan $AgNO_3$

V= Volume contoh uji

- **Limbah awal**

Kadar Cl (mg/L) = $\frac{(17\ \text{ml} - 7\text{ml})\times 0{,}0119\text{N} \times 35{,}40}{25\ \text{ml}}$

$= \frac{10\ \text{ml} \times 0{,}0119\text{N} \times 35{,}40}{25\ \text{ml}}$

$= \frac{4{,}2126}{25\ \text{ml}}$

= 0,168 mg/ml

- **A6I40E2 (0,3 gram)**

Kadar Cl (mg/L) $= \frac{(13{,}75\ \text{ml} - 7\text{ml})\times 0{,}0119\text{N} \times 35{,}40}{25\ \text{ml}}$

$= \frac{6{,}75\ \text{ml} \times 0{,}0119\text{N} \times 35{,}40}{25\ \text{ml}}$

$= \frac{2{,}8435}{25\ \text{ml}}$

= 0,1137 mg/ml

- **A6I50E2 (0,6 gram)**

Kadar Cl (mg/L) $= \frac{(14{,}8\ \text{ml} - 7\text{ml})\times 0{,}0119\text{N} \times 35{,}40}{25\ \text{ml}}$

$= \frac{7{,}8\ \text{ml} \times 0{,}0119\text{N} \times 35{,}40}{25\ \text{ml}}$

$= \frac{3{,}2858}{25\ \text{ml}}$

= 0,1314 mg/ml

- **A8I40E4 (0, 3 gram)**

Kadar Cl (mg/L) $= \frac{(16{,}15\ \text{ml} - 7\text{ml}) \times 0{,}0119\text{N} \times 35{,}40}{25\ \text{ml}}$

$= \frac{69{,}15\ \text{ml} \times 0{,}0119\text{N} \times 35{,}40}{25\ \text{ml}}$

$= \frac{3{,}8545}{25\ \text{ml}}$

= 0,1541 mg/ml

- **A8I40E4 (0,6 gram)**

Kadar Cl (mg/L) $= \frac{(16{,}8\ \text{ml} - 7\text{ml}) \times 0{,}0119\text{N} \times 35{,}40}{25\ \text{ml}}$

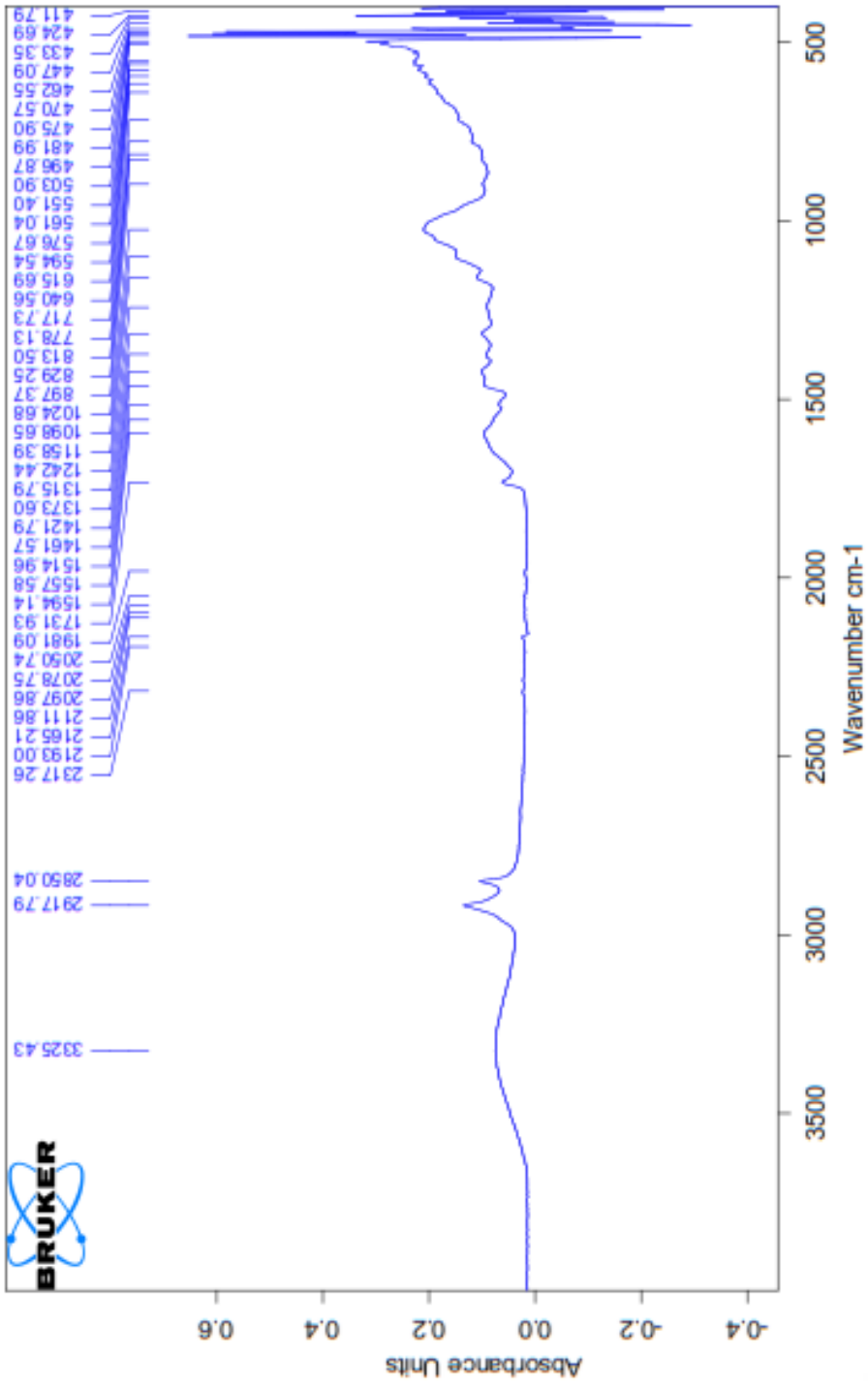
$= \frac{9{,}8\ \text{ml} \times 0{,}0119\text{N} \times 35{,}40}{25\ \text{ml}}$

$= \frac{4{,}1283}{25\ \text{ml}}$

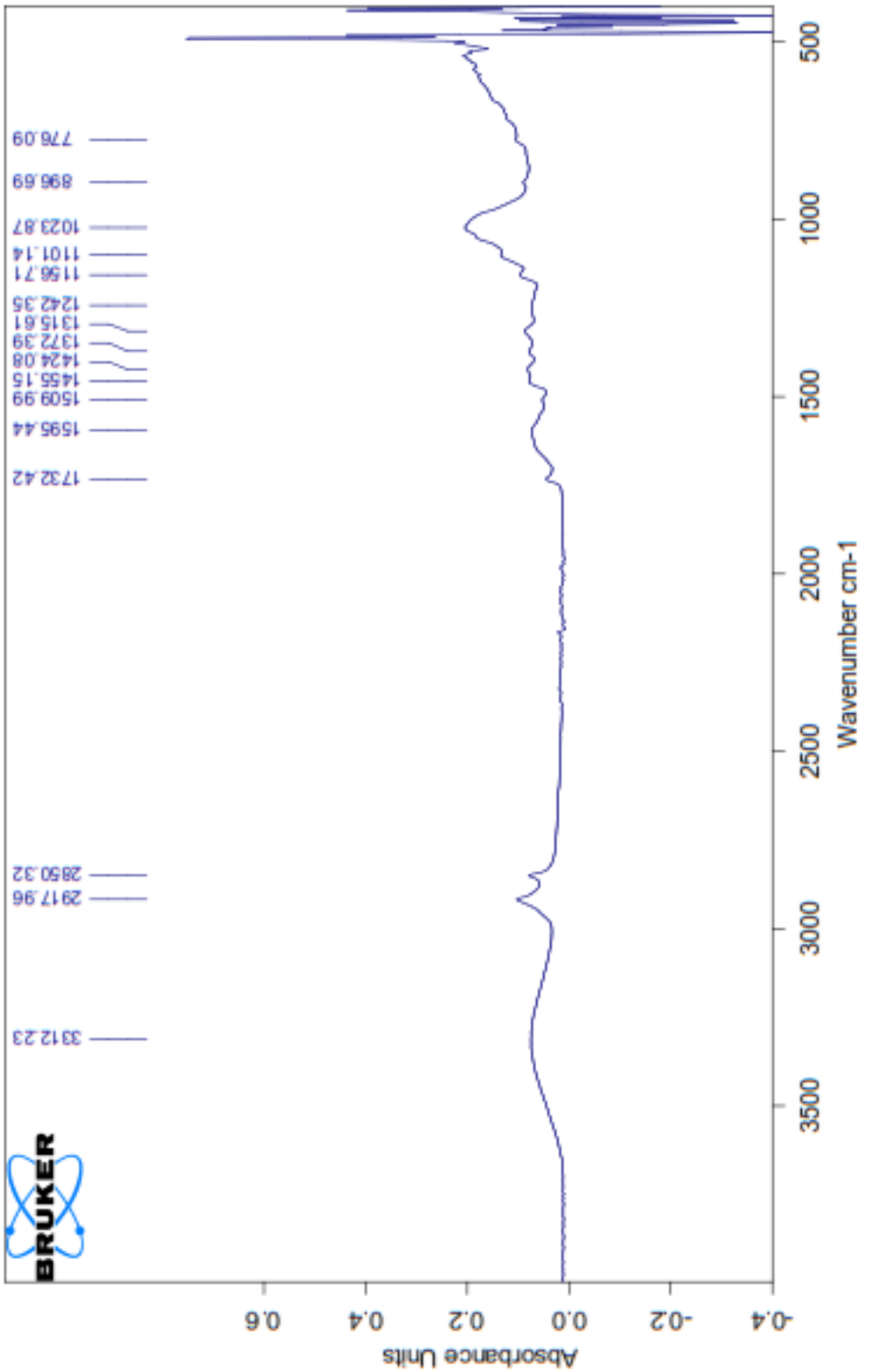
= 0,1651 mg/ml

LAMPIRAN III. DOKUMENTASI ANALISIS GUGUS FUNGSI

- **Analisis Gugus Fungsi *Superhydrophobic Oil* Adsorben Selulosa pada Variasi Sampel A8I40E4**



➢ **Analisis Gugus Fungsi *Superhydrophobic Oil* Adsorben Selulosa pada Variasi Sampel A6I50E2**



LAMPIRAN IV. KARAKTERISTIK PRODUK *SUPERHYDROPHOBIC OIL* ADSORBEN SELULOSA DARI DAUN GLODOKAN TIANG

A6I40E2

Karakteristik	Nilai
Kadar Selulosa	47.10 %
Hidrofobisitas (%)	98,15 %
Morfologi Permukaan	Berserat

A6I40E4

Karakteristik	Nilai
Kadar Selulosa	44.81 %
Hidrofobisitas (%)	98,74 %
Morfologi Permukaan	Berserat

A6I50E2

Karakteristik	Nilai
Kadar Selulosa	47.69 %
Hidrofobisitas (%)	99,74 %
Morfologi Permukaan	Berserat
Gugus Fungsi	O-H hidroksil, C-H, C-H alkana, CH_2 ulur, C-H alkil, C-O ulur, C-H tekuk, C-O-C, Si-O, C-H alkena,

	C-H alkana, Si-O-Si.

A6I50E4

Karakteristik	Nilai
Kadar Selulosa	43.21 %
Hidrofobisitas (%)	98,64 %
Morfologi Permukaan	Berserat

A8I40E2

Karakteristik	Nilai
Kadar Selulosa	44.52 %
Hidrofobisitas (%)	99,04 %
Morfologi Permukaan	Berserat

A8I40E4

Karakteristik	Nilai
Kadar Selulosa	46.14 %
Hidrofobisitas (%)	99,88 %
Morfologi Permukaan	Berserat
Morfologi Permukaan	O-H hidroksil, C-H, C-H alkana, CH_2 ulur, C-H alkil, C-O ulur, C-H tekuk, C-O-C, Si-O, C-H alkena,

	C-H alkana, Si-O-Si.

A8I50E2

Karakteristik	Nilai
Kadar Selulosa	37.00 %
Hidrofobisitas (%)	96,45 %
Morfologi Permukaan	Berserat

A8I50E4

Karakteristik	Nilai
Kadar Selulosa	46.00 %
Hidrofobisitas (%)	99,15 %
Morfologi Permukaan	Berserat

LAMPIRAN V. EFEKTIFITAS *SUPERHYDROPHOBIC OIL* ADSORBEN SELULOSA DARI DAUN GLODOKAN TIANG

A6I50E2 (0,3 gr)

Parameter	Efektifitas
Menetralkan (pH)	8,3
Minyak dan Lemak	96,44 %
Ammonia (NH_3)	42,31 %
Residu Klorin (Cl^-)	32,52

A6I50E2 (0,6 gr)

Parameter	Efektifitas
Menetralkan (pH)	8,1
Minyak dan Lemak	97,78 %
Ammonia (NH_3)	0,96%
Residu Klorin (Cl^-)	22,02 %

A8I40E4 (0,3 gr)

Parameter	Efektifitas
Menetralkan (pH)	8,2
Minyak dan Lemak	96 %
Ammonia (NH_3)	25,96 %
Residu Klorin (Cl^-)	8,55 %

A8I40E4 (0,6 gr)

Parameter	Efektifitas
Menetralkan (pH)	8,2
Minyak dan Lemak	97,78 %
Ammonia (NH_3)	31,73 %
Residu Klorin (Cl^-)	2,02 %

LAMPIRAN IV. BIODATA PENULIS

Nama	:	Titania Aulya Taradiba
Tempat/Tanggal Lahir	:	Cilacap, 19 Januari 2002
Alamat	:	Jalan. Sirkaya No.2 RT 04/RW 09, Kel. Tambakreja Kec Cilacap Selatan, Kab. Cilacap
Telepon	:	08886935442
Hobi	:	Mendengarkan lagu, membuat kue
Motto	:	Tidak semua mimpi harus tertidur terlebih dahulu, kejarlah dengan sekuat tenaga dan tekat niscaya jika mimpi itu milikmu maka akan datang pada waktu yang tepat.

Riwayat Pendidikan:

SD Negeri Tambakreja 07 Cilacap	Tahun 2008 – 2014
SMP Negeri 3 Cilacap	Tahun 2014 – 2017
SMK Migas Muhammadiyah Cilacap	Tahun 2017 – 2020
Politeknik Negeri Cilacap	Tahun 2020 - 2024

Penulisan telah mengikuti Sidang Tugas Akhir pada tanggal Juli 2024, sebagai salah satu persyaratan untuk memperoleh gelar Sarjana Terapan (S.Tr)