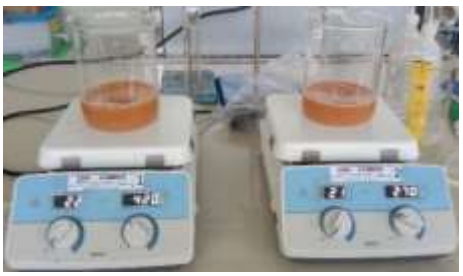
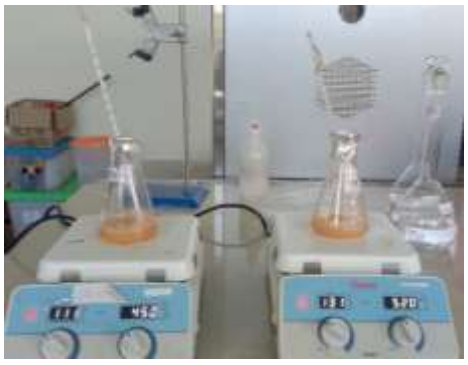
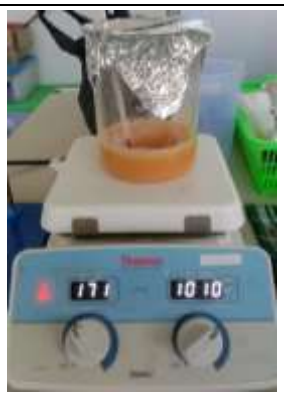
LAMPIRAN

Lampiran 1. Dokumentasi Penelitian

<table>
<tr>
<td> 
(Preparasi biji alpukat)</td>
<td> 
(Perendaman biji alpukat)</td>
</tr>
<tr>
<td>  
(Ekstraksi pati menggunakan pelarut NaOH 0,1 N dan NaS_2O_5 0,031 N)</td>
<td>  
(Proses pemerasan)</td>
</tr>
<tr>
<td> 
(Pati setelah pengeringan)</td>
<td> 
(Proses pengayakan)</td>
</tr>
<tr>
<td> 
(Ekstraksi pati yang dihasilkan)</td>
<td> 
(Alkalisasi larutan pati untuk modifikasi)</td>
</tr>
</table>

 (Penimbangan STPP)	 (Proses modifikasi pati menggunakan STPP)
 (Netralisasi larutan pati)	 (Penyaringan pati yang telah dimodif)
 (Bioflokulan dari pati termodifikasi STPP)	 (Uji kadar fosfat pada pati termodifikasi)
 (Titrasi untuk uji kadar fosfat)	 (Proses pelarutan pati)

 (Proses flokulasi menggunakan *jar test*)	 (Proses pengendapan limbah cair tahu)
 (Limbah awal dan limbah akhir)	 (Limbah cair tahu awal dan hasil proses flokulasi menggunakan dosis optimum)
 (Pengukuran pH)	 (Uji TSS)
 (Penyaringan uji TSS)	 (Uji COD)

Lampiran 2. Perhitungan Proses Ekstraksi Pati

Pembuatan Larutan Ekstraksi Pati

1. Larutan Natrium Metabisulfit ($Na_2S_2O_5$) 0,031 N

   0,031 N = 0,015 M

   BM $Na_2S_2O_5$ = 190,1 g/mol

   M $Na_2S_2O_5$ $= \frac{\text{gr}}{\text{BM}} \times \frac{1000}{\text{mL}}$

   0,015 M $= \frac{\text{gr}}{190{,}1\ \text{g/mol}} \times \frac{1000}{1000\ \text{mL}}$

   0,015 M = 2,851 gr

2. Larutan Natrium Hidroksida NaOH 0,1 N

   0,1 N = 0,1 M

   BM NaOH = 40 g/mol

   M NaOH $= \frac{\text{gr}}{\text{BM}} \times \frac{1000}{\text{mL}}$

   0,1 M $= \frac{\text{gr}}{190{,}1\ \text{g/mol}} \times \frac{1000}{1000\ \text{mL}}$

   0,1 M = 0,4 gr

Proses Modifikasi Pati

1. Pembuatan Larutan NaOH 0,6%

   0,6% $= \frac{gr}{100}$

   0,6 = gr NaOH

2. Pembuatan Larutan HCl 1 N

   ρ HCl = 1,18 gr/mol

   % HCl = 37

   BM HCl = 36,5 gr/mol

   M $= \frac{\rho \times \% \times 1000\ \text{mL}}{\text{BM}}$

   M $= \frac{1{,}18\frac{\text{g}}{\text{mol}} \times 0{,}37 \times 1000\ \text{mL}}{36{,}5}$

   M HCl = 11, 96 M

   $M_1 \times V_1 = M_2 \times V_2$

   11, 96 M $\times$ V_1 = 1 M $\times$ 100 mL

V_1 = 8,36 mL

Perhitungan % Rendemen Ekstraksi Pati

Rendemen % = $\frac{\text{Berat pati kering (g)}}{\text{Berat biji (g)}} \times 100\%$

1. Rendemen dengan larutan perendam Natrium Metabisulfit

   Rendemen 1 = $\frac{30{,}0926\ \text{g}}{500\ \text{g}} \times 100\%$ = 6,01%

   Rendemen 2 = $\frac{42{,}6729\ \text{g}}{500\ \text{g}} \times 100\ \%$ = 8,53%

   Total rendemen = 14,54%

2. Rendemen dengan perendam air dan NaOH

   Rendemen 1 = $\frac{37{,}0370\ \text{g}}{500\ \text{g}} \times 100\%$ = 7,4%

   Rendemen 2 = $\frac{47{,}3168\ \text{g}}{500\ \text{g}} \times 100\%$ = 9,46%

   Total rendemen = 16,86%

Perhitungan Kadar Fosfat dan Nilai Derajat Substitusi

Perhitungan nilai kadar fosfat

7%(W) = $\frac{[(46{,}67-41{,}46)\text{mL}.0{,}5\text{M}.0{,}031.100]}{1\ (\text{g})}$ = 8%

8%(W) = $\frac{[(46{,}67-41{,}83)\text{mL}.0{,}5\text{M}.0{,}031.100]}{1\ (\text{g})}$ = 7,5%

9%(W) = $\frac{[(46{,}67-42{,}36)\text{mL}.0{,}5\text{M}.0{,}031.100]}{1\ (\text{g})}$ = 6,7%

10%(W) = $\frac{[(46{,}67-43{,}63)\text{mL}.0{,}5\text{M}.0{,}031.100]}{1\ (\text{g})}$ = 4,7%

Perhitungan nilai derajat substitusi (DS)

DS 7% = $\frac{162\ \text{x}\ 8\%}{100\ \text{x}\ 31-(31-1)8\%}$ = 0,45

DS 8% = $\frac{162\ \text{x}\ 7{,}5\%}{100\ \text{x}\ 31-(31-1)7{,}5\%}$ = 0,42

DS 9% = $\frac{162\ \text{x}\ 6{,}7\%}{100\ \text{x}\ 31-(31-1)6{,}7\%}$ = 0,37

DS 10% = $\frac{162\ \text{x}\ 4{,}7\%}{100\ \text{x}\ 31-(31-1)4{,}7\%}$ = 0,25

Konversi Dosis Bioflokulan

$$\frac{5\ mL}{250\ mL} \times \frac{1000\ mL}{1\ L} = 20 \text{ mL/L}$$

$$\frac{10\ mL}{250\ mL} \times \frac{1000\ mL}{1\ L} = 40 \text{ mL/L}$$

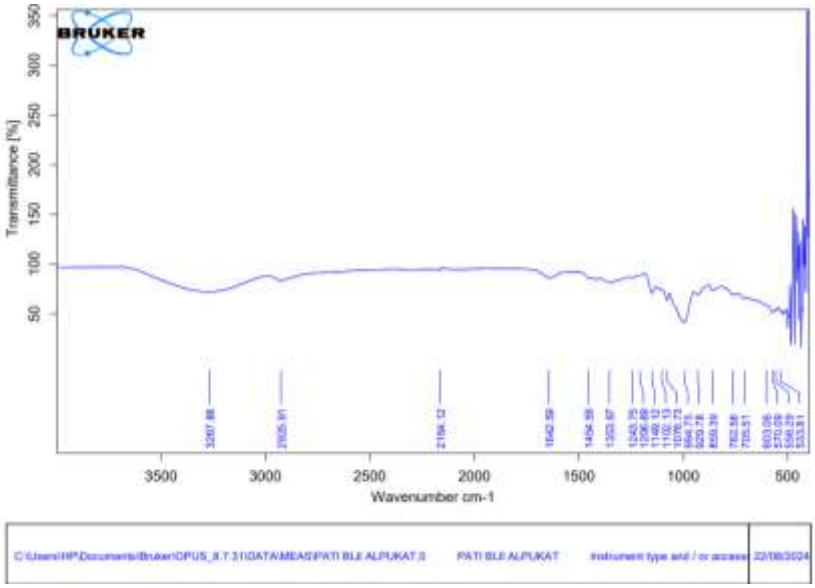
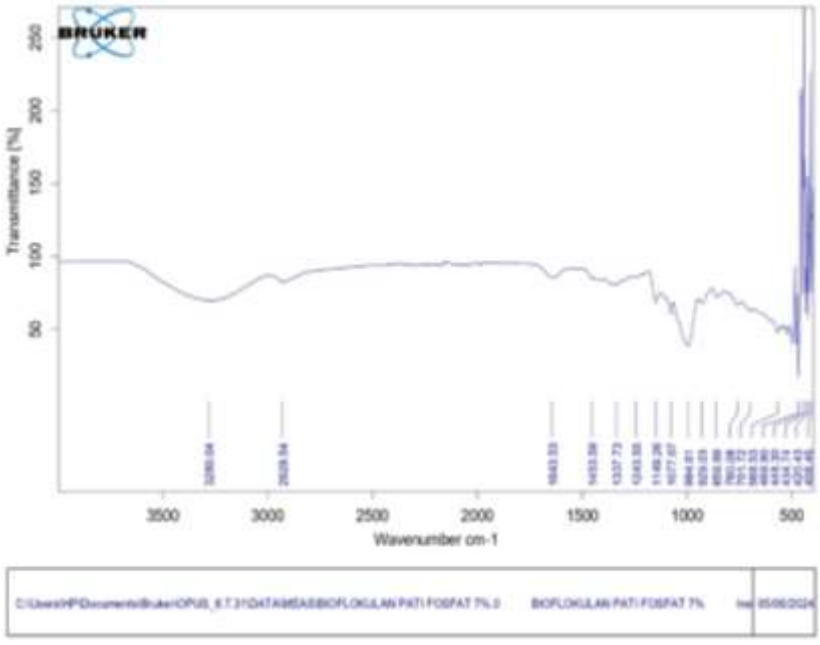
$$\frac{15\ mL}{250\ mL} \times \frac{1000\ mL}{1\ L} = 60 \text{ mL/L}$$

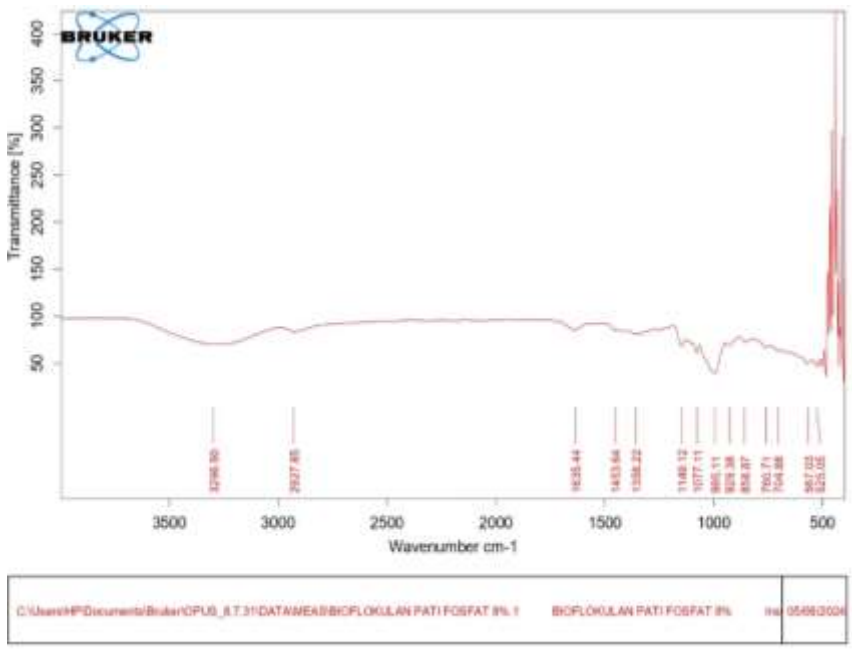
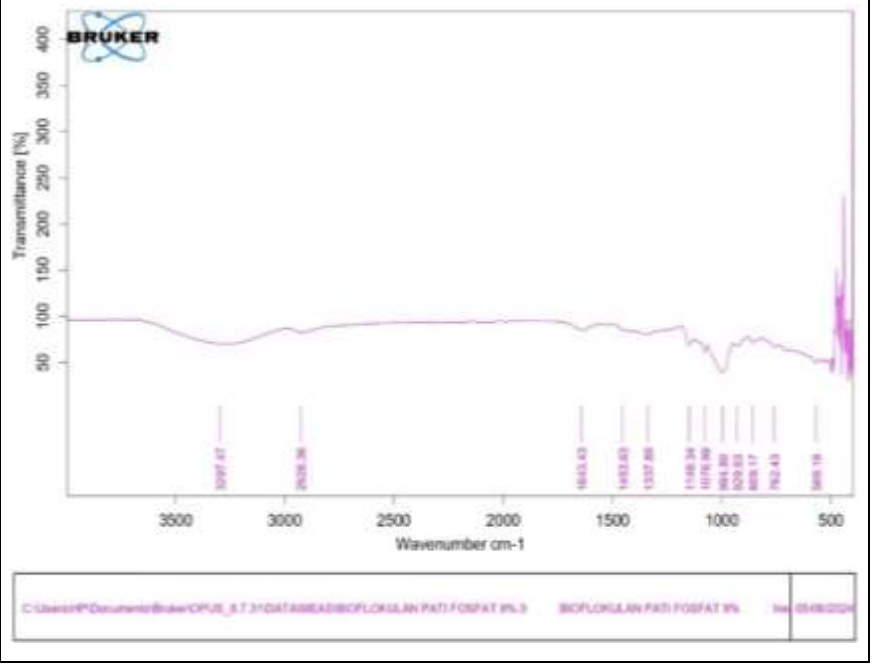
$$\frac{20\ mL}{250\ mL} \times \frac{1000\ mL}{1\ L} = 80 \text{ mL/L}$$

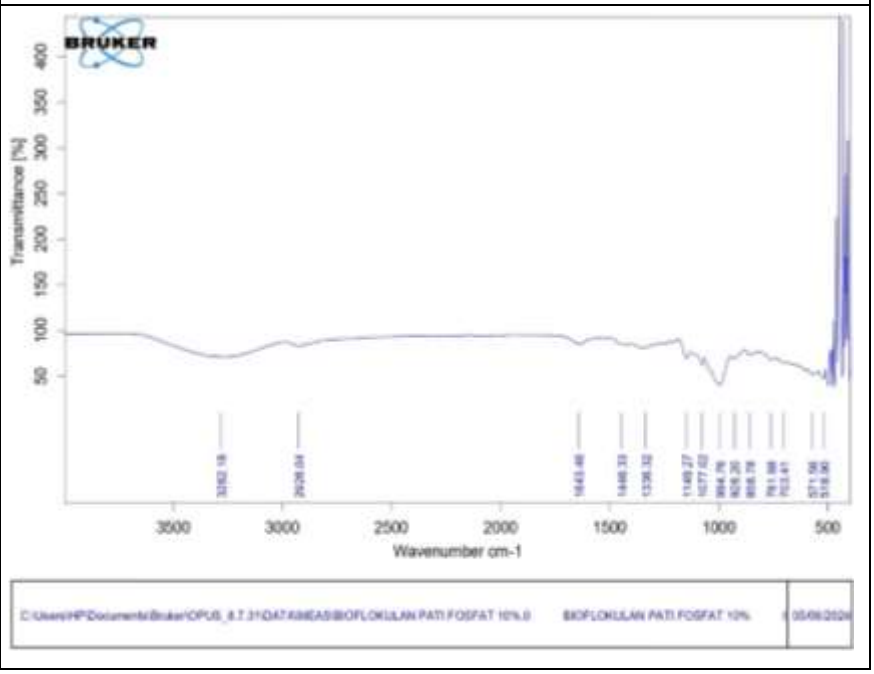
$$\frac{25\ mL}{250\ mL} \times \frac{1000\ mL}{1\ L} = 100 \text{ mL/L}$$

$$\frac{30\ mL}{250\ mL} \times \frac{1000\ mL}{1\ L} = 120 \text{ mL/L}$$

Lampiran 3. Data Hasil *Peak Picking* Sampel

Sampel	Hasil Pengujian
Pati Biji Alpukat	
Bioflokulan 7%	

Bioflokulan	Hasil Pengujian
Bioflokulan 8%	
Bioflokulan 9%	

Bioflokulan	Hasil Pengujian
Bioflokulan 10%	

Lampiran 4. Perhitungan dan % *Removal Effectivity* Parameter Air Limbah

$$\%Removal\ Effectivity\ = \frac{a-b}{a} \times 100\%$$

Parameter COD

Sampel	Keterangan	C (mg/L)	% Removal
Inlet	Awal	565,8	0
Bioflokulan 3%	20 mL/L	431,4	23,7
	40 mL/L	388,6	31,3
	60 mL/L	433,1	23,4
	80 mL/L	378,8	33
	100 mL/L	400,4	29,2
	120 mL/L	424,6	24,9

Parameter TSS

$$mg\ TSS\ per\ liter = \frac{(A-B) \times 1000}{Volume\ contoh\ uji, mL}$$

$mg\ TSS\ per\ liter = \frac{(17{,}354-0{,}6551)\times 1000}{30\ mL}$ = 556,63 mg/L

$mg\ TSS\ per\ liter = \frac{(3{,}235-0{,}6313)\times 1000}{30\ mL}$ = 86,79 mg/L

$mg\ TSS\ per\ liter = \frac{(3{,}026-0{,}6520)\times 1000}{30\ mL}$ = 22,84 mg/L

$mg\ TSS\ per\ liter = \frac{(1{,}325-0{,}6397)\times 1000}{30\ mL}$ = 79,13 mg/L

$mg\ TSS\ per\ liter = \frac{(1{,}052-0{,}6497)\times 1000}{30\ mL}$ = 13,41 mg/L

$mg\ TSS\ per\ liter = \frac{(3{,}102-0{,}6403)\times 1000}{30\ mL}$ = 82,63 mg/L

$mg\ TSS\ per\ liter = \frac{(3{,}132-0{,}6531)\times 1000}{30\ mL}$ = 82,05 mg/L

Sampel	Keterangan	C (mg/L)	% Removal
Inlet	Awal	556,63	0
Bioflokulan 3%	20 mL/L	86,79	84,4
	40 mL/L	22,84	95,89
	60 mL/L	79,13	85,78
	80 mL/L	13,41	97,59
	100 mL/L	82,63	85,15
	120 mL/L	82,05	85,25

Lampiran 5. Biodata Penulis

Nama	:	Nurul Chairunnisa
Tempat dan Tanggal Lahir	:	Cilacap, 22 Juni 2002
Alamat	:	Jalan Puteran RT 02 RW 02 Desa Karangjengkol, Kesugihan, Cilacap, Jawa Tengah
Telepon	:	085748284588
Email	:	nurulchairunnisa900@gmail.com
Hobi	:	Olahraga
Motto	:	Jalani saja, sambil berdoa dan berusaha

Riwayat Pendidikan

1. SD N LOMANIS 02 CILACAP : Tahun 2008 – 2014
2. SMP N 1 KESUGIHAN : Tahun 2014 – 2017
3. SMK MIGAS MUHAMMADIYAH CILACAP : Tahun 2017 – 2020
4. POLITEKNIK NEGERI CILACAP : Tahun 2020 – 2024

Penulis telah mengikuti sidang Tugas Akhir pada Tanggal 9 Agustus 2024, sebagai salah satu persyaratan untuk memperoleh gelar Sarjana Terapan Teknik (S. Tr)